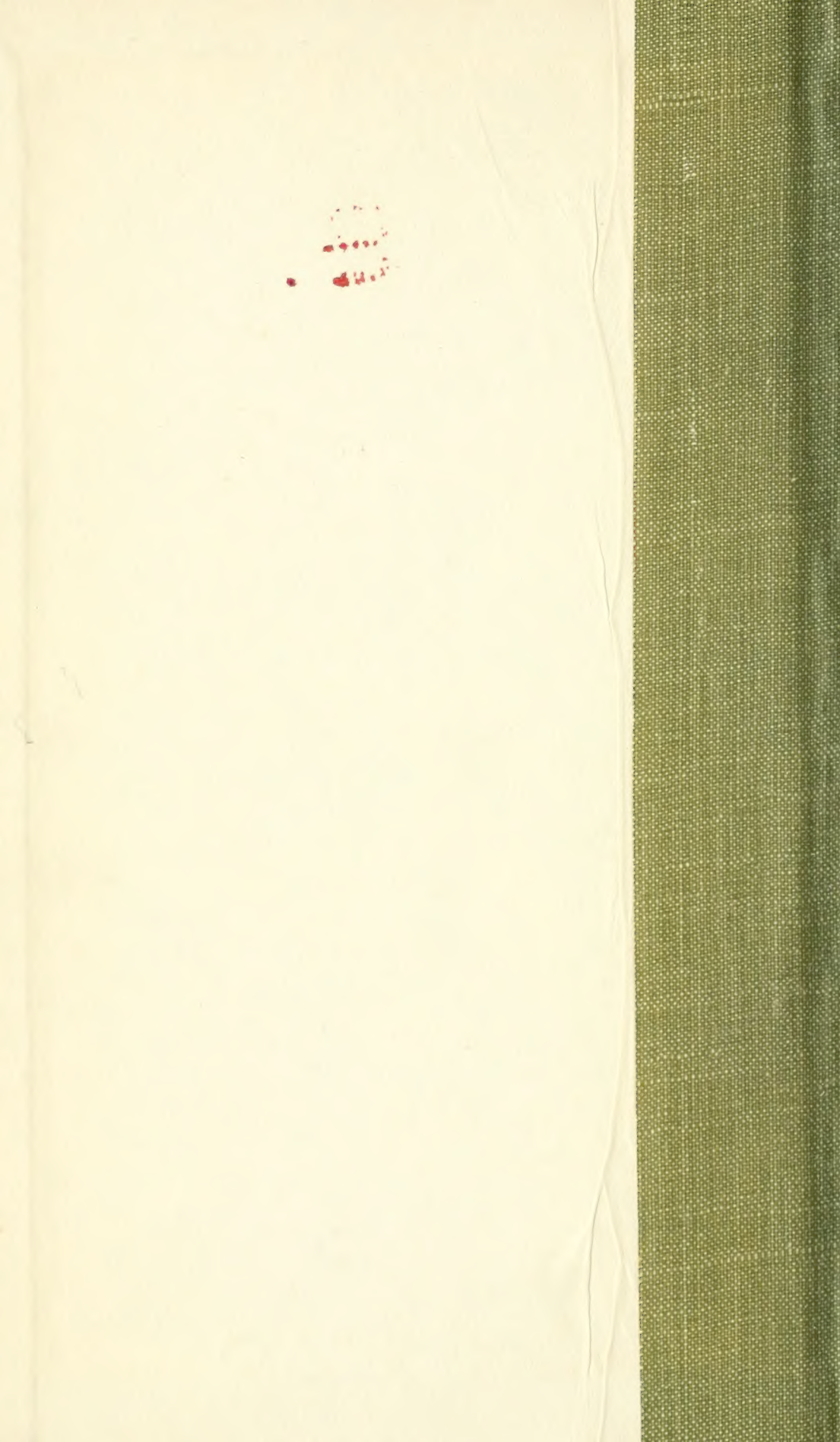


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The Photo-Miniature

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EDITED BY JOHN A. TENNANT

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Photographic Words and Phrases

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The idea of publishing a glossary or little dictionary of photographic words and phrases in this series has haunted me for years. Such a book should be welcomed, especially by the beginner in photography, as answering so many of the questions which perplex him at every turn. It as plainly offers help of the most practical sort to the skilled worker who, reading the literature of his craft, finds himself at a loss for the precise meaning of a word or phrase which he ought to know, but fails to recall. And now, especially, when photography is playing so important a part in the great war, and thousands unfamiliar with its technical vocabulary are being trained in its practice, the time is surely ripe for the publication of the book. But there were difficulties in the way. It seemed like attempting to put the Seven Seas in a quart pot. How could one hope to compress what such a book should contain within the few pages here at our disposal, without carrying the process of elimination to an absurd length, or losing that directness and clearness vital to such a work? And so on.

Two heads are better than one. Into my limping dreams there came an offer to make the book we want, from one thoroughly familiar with the technical terms and "shop practice" of photography on both sides of the Atlantic—the soul of brevity, wholly unafraid, and

as ruthless with the blue pencil as myself. The offer, of course, was instantly accepted, and here, a good deal sooner than was expected, we have our photographic word and phrase book.

There remain two or three things to be said—heart to heart, as it were, with the reader. First, as to the necessary elimination of words and phrases one would have liked to include here. The names of chemicals and terms used generally in chemistry, such as acetone, benzene, amido and hydroxyl groups; phenol, cresol, isomeric, phenolate, and the like are omitted—they may be found in any comprehensive English dictionary. Similarly, almost all photographic trade names, such as Acrol, Azol, Azo, Diophtichrome, Fredol, Kodelon, Mitus, Cyko, Kresko, Roylon, Ingento, Uro, Disco, Kodak, and so on have been left out. For these the reader is referred to the various photographic manufacturers who thus camouflage their products. And, finally, no attempt has been made to give the names of the countless processes introduced in days long past and now obsolete, such as Energiatype, Chrystolotype, Hillotype, Lambertype, Peppertype, and Woodburytype, Amphitype, Amylotype, Anthotype, Anthrakotype, Aurotype, Catalysotype, Crystallotype, Cuprotype, Dallastype, Diaphanotype, Diazotype, Elliotype, Feertype, Fluorotype, Hallotype, Heliotype, Hyalotype, Ivorytype, Linotype, Luxotype, Metotype, Papyrotype, Positype, Simpsontype, Tithnotype, Uranotype. These would need a cyclopedia to themselves. For knowledge of them the student must go back to the old books and histories.

As to the use of this book, many of its entries, as is inevitable, consist of double words or phrases, in seeking which there is always the doubt as to whether one should look up the first word of the combination or the most important word in the phrase. "Dry Mounting" is a fair example. An almost infallible guide can be indicated in such cases as far as this book is concerned. Look up the precise word which you want to know about and you will find the word or a reference to its place.—EDITOR.

ABAXIAL Rays—the oblique or marginal rays passing through a lens.

Aberration—a fault in a lens, such as chromatic or spherical aberration, astigmatism, etc.

Abrasion Marks—on prints. See Stress Marks.

Absolute Aperture—of a diaphragm. The actual diameter, as distinguished from Relative Aperture, (q. v.).

Accelerator—usually the alkali, in a developer, which hastens development and tends to fog.

Achromatic—applied to a lens, means that it renders sharply on the plate the image which is focused sharply on the ground-glass focusing screen.

Acid—opposite to alkaline. Acids unite with bases forming salts, i. e., are neutralized.

Acid Fixing Bath—does not mean a hypo bath mixed with *any* acid, but only with the particular acid, sulphurous or equivalents of it, e. g., soda bisulphite, potass. metabisulphite or soda sulphite with an acid, such as sulphuric or citric.

Actinic—applied to light, means the kind which affects photographic plates and papers, usually blue and violet rays; but almost all rays are “actinic” toward color-sensitive panchromatic plates.

Actinograph—original exposure calculator of Hurter and Driffield, based on their measurements of actinic power of daylight throughout the year.

Actinometer—an instrument for gauging the strength or actinic power of light by an observation of the time taken for a sensitive paper to darken to a standard tint.

Adhesive Tissue—thin paper impregnated with shellac and used in mounting photographs. See Dry-mounting.

Aerial Image—the image (formed by a lens) which exists invisibly as a reduced facsimile of the subject, rendered visible by a screen (focusing screen) placed somewhere between the front and back of the aerial image.

Aerial Perspective—the effect (softening down in tone, color, and detail) of distance upon objects in a landscape.

Air-Bells—minute bubbles of air which cling to a plate

or print in development and lead to white or light spots on the negative or print.

Air Brush—an appliance for distributing liquid color as a fine spray by means of compressed air.

Albumenized Paper—a printing paper (now almost obsolete) in which the sensitive silver salt was held in a film of albumen (white of egg).

Alkali—opposite to acid. Alkalies are substances which neutralize acids. Used chiefly as energizers of developers, forming the “accelerator,” e. g., caustic potash and soda, soda and potass. carbonate, and ammonia.

Alkaline—applied to a solution, means that it has had alkali added to it in excess of any acid in it.

Alum-Hypo Toning. See Hypo-Alum Toning.

Ambrotype—the name given to collodion positives (q. v.) on glass and those by ferrotype process (q. v.).

Anachromatic (Non-Achromatic)—applied to a lens means one which does not give a sharp negative when the subject has been focused sharply. Such lenses are used for their softness of definition.

Anaglyph—stereoscopic pictures consisting of a pair of stereo images printed together in different colors. Stereoscopic effect seen by, say, red-blue pair of spectacles.

Anastigmat—a lens free from astigmatism, i. e., from the defect of failing to render sharply horizontal and vertical lines at the same time over all parts of a *flat* plate.

Angle of View—the greatest angle covered by a lens, viz., the angle included between the two lines drawn from the stop to the edges or, as sometimes reckoned, to the ends of the diagonal—of the plate.

Angular Aperture—differs little from effective aperture (q. v.), but often a little larger. It is the exact value which determines depth of focus.

Angular *F* No.—the focal length of a lens divided by the diameter of its angular aperture. Usually a little larger than the effective *F* No.

Anhydrous—without water. Describes salts such as soda sulphite, soda carbonate, hypo, etc., when sold

with the water of crystallization removed. The "dry" and "strongest" form of such chemicals.

Anti-Halation (Non-Halation)—applied to plates coated with an opaque backing on glass side, or with a colored layer between emulsion and glass, or with a slow and fast emulsion. See Backing and Halation.

Antinous Release—a flexible metal cable so made that pressure on a disc fixed to one end operates the exposure shutter to which the other end is connected.

Anti-Screen (Non-Screen, Self-Screen)—color-sensitive plates the emulsion of which is stained yellow, or having a dyed film substratum, obviating the use of ray-filter or color-screen.

Aphengoscope—a lantern or lantern attachment for opaque objects which are projected onto the screen by the light reflected from them. See Opaque Projection.

Aplanat—a lens both achromatic and free from spherical aberration, working at a fairly large aperture, e. g., $f/8$. Most R. R.'s are aplanats.

Apochromatic (Extra-Achromatic)—a lens by which red as well as yellow and violet rays are brought to the same focus; is especially suited for color photography and three-color reproduction work.

Aquatint—a name applied by some writers to the gum-bichromate process (q. v.).

Argentometer—an instrument used in wet-collodion work to test the strength of the silver bath. See Hydrometer.

Aristotype—original name for print-out papers coated with collodion emulsion, when introduced in Germany, now applied both to collodion and gelatine papers.

Artigue Process—a French method, now obsolete, of direct, non-transfer carbon printing from which it differs in dispensing with use of a temporary support (q. v.) for development.

Astigmatism. See Anastigmat.

Autochrome Process—of color photography. Transparencies in natural colors produced by exposure in an ordinary camera onto a panchromatic emulsion lying immediately behind a mosaic filter of red,

green, and blue starch grains. Negative image, after development, is converted into a positive.

Autographic Back—of film camera. A device whereby the title or data of the subject may be recorded on the film at the time of exposure.

Autotime Scale—a device, fitted to the exposure shutter of film cameras, automatically indicating time of exposure and stop to be used according to subject and strength of light.

Autotype Process—in England means carbon printing. Autotypie (German) is half-tone photo-engraving.

Axis of a Lens—the line connecting the centers from which the two surfaces of a lens are struck.

B—a mark on exposure shutters, signifying "bulb," (q. v.).

Back Combination—rear half of a doublet lens, usually consisting of a single lens or element of about double the focal length of the whole objective.

Back Focus—distance from the back surface of the lens to the focusing screen when a distant object is focused. Indicates only the camera extension required for a given lens.

Back Focusing—adjustment of camera by movement of rear part carrying focusing screen and plate-holder. Found usually in ancient cameras. Modern instruments have both back and front focusing.

Backing—light-absorbent material, black or red, applied to the glass side of a plate to prevent halation (q. v.). Sometimes placed (in manufacture) between glass and emulsion.

Ball-and-Socket Head—attachment to tripod for cameras of moderate size, permitting of angling and tilting in any direction and of clamping in any position.

Barrel-Shaped Distortion—by single lens. See Curvilinear Distortion.

Baryta (Barium Sulphate)—material applied as a coating to raw paper before coating with sensitive emulsion. This keeps the picture image from sinking into the paper and so yields crisp, brilliant prints.

Between-Lens Shutter—diaphragm shutter (q. v.).

Bichromated Gelatine—gelatine impregnated with bichromate of potash, soda, or ammonia. Sensitive to light, the gelatine becoming insoluble.

Biconcave Lens—having both outer surfaces of concave form.

Biconvex Lens—having both outer surfaces convex.

Bis-Telar—a telephoto lens giving a fixed magnification (q. v.) of about $1\frac{3}{4}$, with the normal camera extension.

Black-Line Process—of copying plans. See Ferro-gallic.

Black Vignette—in which a portrait shades off to black instead of to white as in an ordinary vignette.

Blanchard Brush—a loop of soft flannel or swansdown attached to a strip of glass by an elastic band. Used for applying sensitizing solutions, a new length of flannel being taken for each operation.

Bleaching Baths—chemical solutions used in intensification and toning to turn the black silver image white, or pale buff, or gray. This they do by converting the silver image into silver chloride, bromide, or iodide or other non-colored and insoluble silver salts.

Bleach-out Process—of color photography, in which paper coated with a mixture of three highly light-sensitive dyes (together forming a black coating) is exposed under a colored original and yields a color-reproduction, though one far from satisfactory in fidelity.

Blisters—bubbles formed between the emulsion film and its glass or paper support. Due to too strong solutions, differences of temperature, etc.

Blocking Out—painting over, on a negative, all but a particular part by means of opaque pigment or strongly colored dye. Done on either film or glass side.

Blue-Print Process—used chiefly for copying plans. See Ferro-Prussiate Process.

Bolting Cloth or Silk—meshed fabric used for obtaining diffused definition in enlargements by inserting it (stretched on a frame) between the lens and sensitive paper.

Border Tints—mounting papers coated with shellac for use in producing border effects by dry-mounting.

B. P. (British Pharmacopœia)—indicates a standard of

strength and purity of chemical preparations adopted by pharmacists.

Brilliant Finder—a view-finder (q. v.) constructed entirely of lenses and a mirror (or prism), and giving a more brilliant image than finders resembling miniature cameras.

Bromide Paper—paper coated with gelatino-bromide of silver emulsion; the invisible image, produced by exposure through a negative or in an enlarger, is developed.

Bromoil—a print produced by bleaching a bromide print and restoring the image by applying pigment with a brush.

Bromoil Transfer—a replica (except that it is reversed as regards right and left) obtained by taking an impression on plain paper from a freshly pigmented Bromoil print.

Bronzing—the metallic appearance of the shadows of a print due to over-printing.

Builds Up—develops, i. e. gains in density and detail; a term used to denote progress of negative or print during development.

Bulb—setting of shutter (marked B) whereby the exposure begins on operating the release and continues as long as the release-movement is maintained, e. g., trigger pressed down, or rubber bulb or Antinous release kept pressed.

Burnisher—a machine for giving a glossy surface to prints, consisting of two heated steel rollers, (or a bar and a roller) between which prints are passed with pressure. Much less used than formerly.

Burnishing—producing a glossy surface by means of a burnisher..

Bush—British term for the threaded socket in a camera, which engages the tripod screw.

Buttons, Photo—circular miniature photographs (portraits) mounted in a thin metal rim. Usually faced with celluloid.

C (enclosed in a circle)—when marked on a photograph is a sign of registration at Washington under U. S. Copyright, Act of 1909.

- C (Centigrade)**—indicates temperatures according to the Celsius or Centigrade scale on which boiling water is 100 and the freezing point 0.
- Cabinet**—size of portrait photograph, never larger than $6 \times 4\frac{1}{4}$ inches, but often somewhat smaller.
- Cabinet Attachments**—another name for repeating back (q. v.) as used in studio portraiture.
- Cable Release**—a flexible metal cable actuating the exposure shutter. See Antinous Release.
- Calcium Tube**—an air-tight receptacle containing calcium chloride which absorbs moisture and so keeps paper, etc., stored in the tube perfectly dry.
- Calotype**—process of Fox-Talbot (1841) in which paper sensitized with potassium iodide, silver nitrate, and gallic acid was developed with a mixture of the two latter.
- Carbon Process**—a method of making prints, the images of which consist of actual color pigment. These are produced by exposing to light a mixture of gelatine, pigment, and potass. bichromate. The gelatine becomes insoluble where light acts on it and so fixes the pigment.
- Cartridge, Film**—roll of sensitive film (for negatives) wound on a spool and enclosed within a longer band of black paper for daylight changing (q. v.).
- Casket Lenses**—sets of lenses of different focal lengths, one such casket serving to form a considerable number of single and doublet lenses.
- Catatype**—a process of making prints from negatives without action of light, viz., by catalytic action of the silver image.
- Caustic Alkali**—strongest form of alkali, e. g., caustic potash, caustic soda, and, in somewhat lesser degree, liquor ammonia.
- C. C.**—collodio-chloride printing paper. c.c.—cubic centimeter=about 17 minims.
- C. de V.**—carte de visite, an early size— $3\frac{1}{2} \times 2\frac{1}{4}$ inches—of portrait photograph.
- Cent.**—abbreviation of Centigrade. See C.
- Ceramics. Photo**—photographs made in burnt-in fusible pigments. Produced from negatives by the powder, carbon, and other processes.

Chalky—applied to negatives or prints which show excessive contrasts, i. e., are too much like a black-and-white drawing.

Changing Bag—a bag of opaque material in which plates may be removed from or loaded into holders in daylight.

Changing Box—a camera attachment, similar to a magazine holder usually holding twelve plates, which can be exposed in turn.

Charbon Velours—original name of the French direct development carbon paper better known as Artigue paper (q. v.).

Chemical Focus—a lens is said to have a “chemical focus” when the image, obtained sharp on the focusing screen, is not sharp on the negative.

Chemical Fog—on plates or papers; produced by chemical means, such as too energetic or contaminated developer—not by action of light.

Chromatic Aberration—a defect of a lens which renders it non-achromatic. See Achromatic.

Chromogram—the three-image transparency of the Ives Kromskop (q. v.).

Chrono-Photography—process of photographically recording successive stages in the movement of an object. Forerunner of cinematography, viz., the reproduction of the effect of movement.

Chrysotype—a process introduced by Herschel (1842), by which a print consisting of metallic gold was obtained by exposure of paper coated with a sensitive iron salt.

Circle of Confusion—the permissible size of disc (in the image formed by a lens), which should be a point only; 1-100th or 1-200th of an inch (diameter) is arbitrarily adopted, but conditions may require a smaller “disc of confusion.”

Circle of Illumination—of a lens. See Illuminating Power.

Clearing Solutions—those which remove stain from negatives or prints without altering the support of the image.

Clogged—in reference to shadow parts of a print or highlights (dense portions) of a negative—means of

one heavy tone or depth instead of recording differences in tone in the subject.

Collodio-Bromide—refers to processes in which the sensitive substance is silver bromide formed in collodion. Used in early lantern slide and negative making.

Collodio-Chloride—the name of processes in which silver chloride is formed in collodion, e. g., collodio-chloride, or C.C. print-out paper.

Collodion—a solution of nitro-cellulose in a mixture of alcohol and ether. Used as a means of holding sensitive silver salts in suspension for coating on paper, etc.

Collodion Emulsion—a light-sensitive mixture consisting of silver compounds (chloride, bromide, etc.) formed and remaining suspended in collodion.

Collodion Positive—a form of photograph popular from 1855 to 1870, called Ambrotype in America. Actually a negative on glass backed up with black varnish or velvet. The plate being developed by special means to a whitish image, this latter against the dark ground yielded a positive.

Collodion, Wet. See Wet Collodion.

Collotype—a photo-mechanical process in which the printing plate is a sheet of glass or zinc coated with bichromated gelatine, exposed under a negative, washed and prepared for printing by rolling with a greasy ink.

Colloids—substances resembling glue, i. e., non-crystalline bodies, the chief of which used in photography are gelatine, agar-agar, gum, and albumen.

Color Screen—a color- or light-filter (q. v.).

Color-Sensitizer—a dye or dye solution which renders dry-plates sensitive to rays such as yellow, green, and red, in addition to the blue to which ordinary, untreated plates are chiefly sensitive.

Coma—an aberration of a lens consisting in the unequal magnifying power of different concentric zones of the lens; also termed zonal aberration.

Combination Printing—a method for combining parts of several negatives in one print, e. g., the introduction of an additional figure into a group, or of a sky into a landscape.

Combined Bath—a mixture which both tones and fixes prints on print-out paper.

Composite Portrait—superimposed impressions from several negatives of portrait subjects (taken full face) on a single print. Other methods of producing the same effect have been used. Claimed to have some anthropological value.

Concave Lens—negative lens (q. v.).

Concavo-Convex Lens—concave on one surface; convex on the other. More commonly called “meniscus.”

Concentric—the name given to an anastigmat lens, the radii of the back and front surfaces of each element of which were struck from a common center.

Condenser—a lens which collects rays falling upon it from a source of light to a beam of cone-shape, which will thus pass through a small opening, e. g., the lens of an enlarger or projection lantern.

Conjugate Foci—the distances from object to lens and from lens to image when photographing any object. Their actual length is determined by the focal length of the lens; their relative length by the scale upon which an object is being copied.

Continuing Action of Light—a term used to denote the property of exposed carbon tissue and other bichromated films, of proceeding further toward insolubility of the gelatine, etc., when kept. Does not take place in perfectly dry storage.

Contrasty—applied to prints with very dark shadows and white highlights, due to under-exposure or over-development of the negative.

Control Processes—printing methods in which the tones of the print are susceptible to considerable modification at the will of the operator, e. g., gum-bichromate, oil, and Bromoil.

Convertible Lens—one in which the two component glasses (front and rear elements) can be used as separate lenses.

Copper Toning—of bromide and D. O. P. prints. A mixture of copper sulphate, potass. ferricyanide, and potass. citrate yields colors progressing from warm black to red.

Copy Board—the board or easel to which originals are fixed in copying and reproduction methods.

Copy Negatives—those made from other negatives or from prints either by contact or in the camera.

Copying Stand—a baseboard or table carrying camera and copy board for the photography of flat originals, and providing for the movement of one "square" with the other.

Copyright—the sole right to copy, reproduce, or "colorably imitate" a photograph. Granted in respect to photographs, and regulated in U. S. by Act of 1909 and in Great Britain by that of 1911.

Corrosive Sublimate—mercuric chloride, also termed mercury bichloride and mercuric perchloride.

C. P.—as applied to chemicals, denotes "chemically pure."

c. p. = candle-power.

Covering Power—of a lens. The capacity of a lens to give a sharply defined image to the edges of the plate it is listed to cover, when focused with the largest diaphragm opening.

Cristoid Film—a flexible sensitive film (no longer made) resembling the modern double-coated plate. It consisted of two gelatine emulsions—a slow and a rapid—without any celluloid or other support.

Cross Lens—a lens, each surface of which is either concave or convex, but each of different curvature.

Cross Front—sliding movement of the front or lens standard on a camera which carries the lens. Perhaps the movement which can be most readily dispensed with in a camera, excepting those of square pattern without reversing back, with which the cross front becomes the rising front when camera is reversed.

Cross-Line Screen—a diamond-ruled glass screen used in making negatives for half-tone engravings.

Cryst.—indicates the crystallized form of any chemical as distinguished from the dry or anhydrous form.

Crystoleum—a photograph colored by first rendering it semi-transparent and then applying colors to the back. Comparatively crude coloring in this way yields soft and pleasing effects, owing to the interposition of the photograph.

Curtain Aperture—the slit, fixed or variable, in the curtain or blind of a focal-plane shutter.

Curtain Slide—a flexible form of the slide or shutter of a plate-holder. Adopted chiefly for the large holders used in studio cameras.

Curvature of Field—a defect of a lens whereby the image of a flat subject is not flat but is formed on a saucer-shaped surface.

Curvilinear Distortion—a defect of a single lens whereby straight lines falling near the margins of the plate are bent outward, if the stop is in front of the lens (barrel-shaped distortion), and inward when the stop is behind (pin-cushion distortion).

Cut Films—fairly stiff celluloid coated with sensitive emulsion for negatives. Made, though less largely than formerly, in the same sizes as dry-plates and placed for exposure in ordinary plate-holders.

Cut-Off—obstruction of light, e. g., by projecting mount of lens within camera, by projecting baseboard when using wide-angle lens or, in short, by any means which is the cause of shadow or lesser illumination on part of the sensitive plate.

Cut-Out Mount—a card mount in which is an aperture, usually with beveled edges and a little smaller than the picture. It is fixed over the print, mounted on another card.

Cutting Shape—a plate, usually of glass, of the size to which a print is to be trimmed. It is laid on the print and a knife run around it.

Cyanographic (Cyanofer)—a plan-copying process yielding copies in blue lines on a white ground from ordinary black-line originals.

Cyanotype Process—the familiar blue-print process, due to Sir John Herschel. Negative cyanotype giving a blue image on a white ground (from a photographic negative) or white lines on a blue ground (from a drawing or plan); positive cyanotype giving blue lines on a white ground. See Cyanofer.

DAGUERREOTYPE—the first process (1839) producing a fine photographic result. A silver plate is rendered sensitive by iodine vapor, exposed in the

camera, and "developed" by exposure to vapor of metallic mercury.

Dark Slide—a non-descriptive British name for a plate-holder. When holding only one plate, termed "single slide;" those for two plates are often called "double backs."

Daylight Changing—methods of bringing sensitive plates or films into position for a series of exposures without recourse to a darkroom. Embodied almost exclusively in devices for films, e. g., film-spools, film-packs, and, in the form of a magazine, for plates.

Deferred Fixing—fixing plates some time (weeks or months) after development, the plates being treated with a solution such as potass. bromide or alum and citric acid to preserve them from further fogging in the interval.

Definition—degree of sharpness, i. e., distinctness of small detail in the picture image, negative, or print.

Deliquescent, i. e., absorbing moisture from the air and becoming liquid.

Depth of Field—rendering of both near and distant objects sharp on the one negative. Sometimes called "depth of focus" or "depth of definition."

Desiccated—the dry or anhydrous form of chemicals as distinguished from "cryst."

Developer—a solution which brings up (renders visible) the invisible effect of light on a plate or paper.

Developing Out Papers (D. O. P.)—papers requiring to be developed, but of such sensitiveness that they can be printed by exposure to gaslight, yet developed by the same, placed at a greater distance.

Diaphragm (Stop)—the aperture in, or in front of, the lens. Large or small, relatively to the focal length, according as the lens is rapid or slow. See, also, Iris, Rotating, and Waterhouse Diaphragms.

Diaphragm Shutter—one working approximately in the position of the diaphragm in the doublet lens. Constructed of leaves or blades which open and then close the aperture in the exposure shutter.

Dichroic Fog—i. e., of two colors (in a negative): red when seen by light coming through; green by light

reflected from the negative. Due to defects in the emulsion, hypo in the developer, etc.

Diffused Light—that coming from the sun through light clouds or, from a source of artificial light, through ground-glass, paper, etc., i. e., one not casting a distinct shadow.

Diffusion of Focus (Soft Definition)—unsharpness in the picture image due to a defective lens, or a special lens, or imperfect focusing.

Direct Positive—the positive image obtained by exposure in the camera, e. g., Daguerreotype, ferrotype; by chemical processes of “reversing” (q. v.); or by causing the negative image to appear positive as in the ferrotype process (q. v.).

Disc of Confusion. See Circle of Confusion.

D. O. P. See Developing out Papers.

Dope—the varnish used to facilitate retouching, or the opaque used to block out portions of a negative.

Double Back—British term for a double plate-holder.

Double Exposure—applied to the accidental exposure of the same plate or film twice in the camera—on different subjects; also to making two photographs on different parts of the same plate by means of screens in front of the plate or on the lens-hood.

Double Extension—applies to a camera or bellows which allows of a distance between lens and focusing screen about double the focal length of the lens, e. g., 20 inches in a 5 x 7-inch camera.

Double Image—duplication of the outlines of a photograph due to movement of the camera or subject at the time of exposure, or, in a print, to the paper shifting during printing.

Double Tones—one tone in the highlights and another in the shadows of a print, the result, usually, of an exhausted toning bath.

Double Transfer—a form of the carbon printing process whereby reversal of the subject as regards right or left is avoided.

Double Transfer Paper. See Transfer Paper.

Doublet—a lens combining two separate components or elements, usually with the stop between, e. g., a “rapid rectilinear.”

Drop Shutter—a primitive form of instantaneous exposure shutter consisting of a wooden panel with a hole in it, arranged to fall by its own weight in front of the lens.

Dry Mounting—a method of mounting by means of thin tissue paper impregnated with shellac. This tissue is laid between print and mount and, on heat being applied, fixes the two together.

Dry-Plates—now synonymous with sensitive plates prepared with gelatine emulsion. In past literature the term has not this signification, the first dry-plates (about 1856) having been prepared with collodion.

Dusting-on Process. See Powder Process.

EAU DE JAVELLE—a mixture made by shaking together soda carbonate and chloride of lime and pouring off from the sediment. The active substance is hypochlorite, a remover of developer and other stains.

Effective Aperture—the real aperture which, for a lens of given focal length, determines the speed of the lens. In a doublet lens, not the actual diameter of the diaphragm but a little greater, owing to the converging action of the front combination.

Effective F No.—the focal length of a lens divided by the diameter of its effective aperture. The real measure of speed of a lens.

Efficiency of Shutters—the proportion of the time (of the total exposure given by a shutter) during which the aperture of the shutter is fully uncovered.

Egyptian Vignettes. See Black Vignettes.

Emulsion—a mixture holding a solid in a very finely divided state. Gelatine dry-plates and papers are coated with an emulsion containing silver bromide or chloride suspended in gelatine solution. Such emulsions are fluid when warm, set when cold, and harden on drying.

Enamel Collodion—collodion containing a little castor-oil, used for giving a glazed surface to prints.

Encaustic Paste—a mixture of wax, varnish, etc., which is rubbed over the surfaces of prints, giving them a luster.

Enclosed Arc—an arc lamp in which the carbons are in a glass chamber and thus burn much more slowly, being surrounded by the products of their own combustion. This form permits a much greater length of arc and yields a light rich in ultra-violet rays.

Equivalent Focus. See Focal Length of lens.

Erecting Prism—a total-reflection prism fitted to the lens of a projection lantern for the purpose of correcting the inversion of the image on the screen. Employed chiefly in projecting apparatus, experiments, etc., which cannot be placed upside down in the lantern.

Etching Knife—a fine blade used by retouchers in shaving down the density of a negative at any desired part.

Everset Shutter—an exposure shutter which automatically resets itself and so is always ready for use without the need of adjustment after each exposure.

Exposure—as used by photographers signifies (1) the period of time during which a plate or film is exposed to light-action, e. g., "an exposure of 5 seconds," and (2) the act of taking a photograph, e. g., "film for twelve exposures."

Exposure Indicator—a device attached to plate-holders to show that the shutter has been withdrawn and re-inserted, i. e., exposure of plate.

Exposure Meter—an instrument for finding the correct exposure by testing the strength of the light by means of a sensitive paper: used also (erroneously) for devices which serve to calculate exposure from data of the sun's strength at different times of day and year by an adjustment of a scale.

Extension—of camera, distance to which the front of the camera, carrying the lens, can be drawn out from the back, carrying focusing screen and plate.

Extension Adapter—a detachable fitting, usually of bellows form, to the back of the camera, providing further extension and accommodating a focusing screen and plate-holder of the original or a larger size.

Extension Base—a detachable frame which can be fitted to the camera bed, thus providing for greater bellows extension when needed.

Extra-Focal Distances—the distance from lens to object and lens to plate (when photographing), in each case less the focal length of the lens. Their use greatly simplifies calculation.

F (Fahr.)—indicates temperatures according to the Fahrenheit scale on which the temperature of boiling water is 212° and of ice 32° .

F (f/.) Numbers—denote the "speed" of a lens. About the most rapid lens is $f/3$ to $f/4.5$; rapid, $f/5.6$ to $f/6.8$; medium, $f/8$ to $f/11$; slow (wide-angle lenses) $f/16$ to $f/22$. The $f/$ number is the number of times the diameter of the stop will divide into the focal length of the lens.

Factorial Development—a system of determining the full time of development (in negative making) by noticing the time taken for the image to appear and then continuing development for a multiple of this time. The multiple is called the development factor and varies with different developers.

Falling Baseboard—a hinged camera bed or baseboard, which can be let down below the level, so as not to come in the view of a wide-angle lens.

False Image—an extra image, usually unsharp and often inverted, which a defective (doublet) lens will give on the plate at the same time as the image proper.

Ferro-Gallic Process—for copying plans giving black lines on white ground.

Ferro-Prussiate Process—a method of making prints of blue color on paper sensitized with a ferric salt and potass. ferricyanide. The printed-out image is "developed" and fixed in plain water only.

Ferrottype Plate—a thin metal plate, coated with polished enamel, used for giving a high gloss to prints by drying them, film sides in contact with the plate.

Ferrottype Process—a method of making positive portraits direct in the camera. A *whitish* image is developed on a dark enameled iron plate (ferrottype plate) coated with emulsion. The image (negative) thus supplies the light parts of the subject; the shadows are formed by the dark metal support.

Film—the coating of emulsion on a plate or paper; also the complete coated material consisting of emulsion on celluloid, e. g., roll film, flat or cut film.

Film Pack—a cardboard or metal holder containing, usually, 12 cut films so placed in it that, by pulling in succession projecting paper tabs, the films are brought into position for exposure in the camera and then carried in turn to the back of the pack. The device is, in fact, a magazine film-holder, with the spool-film advantage of permitting one to load in daylight.

Film Pack Adapter—a frame of wood (or metal) for holding a film pack in place for exposure in the camera.

Final Support. See Transfer Paper.

Finder. See View-Finder and Brilliant Finder.

Fixed Focus—as applied to a camera, means one in which the lens is "fixed," i. e., not moved to and fro for focusing objects at different distances. Implies the use of either a small stop in the lens or a lens of very short focus.

Fixing—amounts to "rendering permanent," and consists in the removal of the parts of a sensitive film left unaltered by exposure or development, or both—in the case of dry-plates or film, of silver bromide.

Fixing-Hardening—of film, plates, or prints in a bath which removes the unaltered silver bromide and at the same time toughens the gelatine film.

Flare Spot—a patch, dark in the negative and light in the print, caused by a defect in the lens and occurring, usually, when a small stop is used and when strong light shines on the lens.

Flash Powder—a mixture of powdered magnesium or aluminum with a substance such as potass. chlorate, potass. nitrate or thorium nitrate which promotes its rapid combustion. Such powders are explosive and should be handled with due carefulness.

Flat—applied to negatives or prints and meaning lacking in contrast.

Flat Field—applied to a lens which, when photographing a flat subject, e. g., a painting, gives equal definition in all parts of the plate.

Focal Aperture (Relative Aperture)—a term expressing the speed of a lens. See *F* Numbers.

Focal Capacity—an item in the specification of a camera denoting the greatest focal length of lens which can be used.

Focal Length—distance of a lens from the focusing screen (the focus) when a very distant object (so distant that the rays from it are parallel when they reach the lens) is sharply rendered.

Focal Plane—the surface in which lies the sharp image of a photographed scene or object. Somewhat of a misnomer, as the surface in which a lens forms a sharp image is never perfectly flat. See Plane.

Focal-Plane Shutter—an exposure shutter of the roller-blind or curtain type, placed as nearly in contact with plate or film as possible.

Focus—the *point* at which rays falling on a lens are brought together, but often used to denote Focal Length (q. v.).

Focusing—the operation of altering the distance between lens and screen for the purpose of securing sharp definition, according to distance of the subject. See, also, Scale Focusing.

Focusing Jacket—a mount or double tube fitted to the lens, permitting of a back-and-forth movement of lens. In portrait lenses and lantern objectives this is effected by a rack and pinion device; in hand-camera lenses, by means of a lever operating a metal stub in a curved slot.

Focusing Magnifier (Focusing Glass or Eyepiece, Compound Focuser)—a magnifying combination of (usually) two lenses for the critical examination of the image on the focusing screen. Usually mounted in a tube sliding within another and permitting of adjustment to the user's sight.

Focusing Scale—a small graduated scale on the camera, the marks on which indicate the position in which the lens or camera front requires to be placed in order to render sharply objects at different distances.

Focusing Screen—a screen of glass fitted to the back of the camera and rendered fine matte for judging and focusing the image formed by the lens.

Fog—a veil or deposit on a plate or print other than that produced by the image formed by the lens. May be caused by exposure to light, wrongly compounded developer, defective emulsion, etc.

Forcing—in development. Treating under-exposed plates or prints by adding alkali or continuing development for a long time in order to get detail or density.

Free Silver—means soluble silver salt, e. g., silver nitrate, silver sulphate, as distinguished from insoluble silver compounds such as silver bromide, chloride or iodide.

Frilling—the separation (with wrinkling) of a film from its glass or paper support, caused by strong solutions alternating with weak or plain water, differences of temperature, alkaline baths, etc.

Front Combination—the front half of a doublet lens.

Front-Focusing—a movement of the camera according to which focusing is done by moving the lens to and from the plate.

F. R. P. S.—Fellow of the Royal Photographic Society (London, England).

Full Aperture—the largest diaphragm or stop with which a given lens is fitted.

GAMMA— γ , the third letter of the Greek alphabet, adopted by Hurter and Driffeld to express the development factor, or degree of contrast or gradation capacity of a plate.

Gamma Infinity— γ_{∞} , the sign used to express the greatest possible factor, or degree of contrast, to which a plate can be developed.

Gaslight Paper—British equivalent for Developing Out Paper (q. v.).

Gelatino-Bromide—refers to processes and materials in which the sensitive substance is silver bromide formed in gelatine, e. g., gelatino-bromide plates, papers, etc.

Gelatino-Chloride—as gelatino-bromide, but with silver chloride as the sensitive substance.

Glazing—of prints, by drying in close contact with glass or other polished surface, such as a waxed ferro-

type plate, and stripping off when dry; or, less commonly, by the application of a glossy collodion film.

Glazing Solution—used for facilitating the removal of prints from glass or other support when glazing. Also termed “stripping” solution. Composed of formaline, ox-gall, etc.

Gold—in formulas for toning baths, often used instead of the full form “Gold Chloride.” A bath is said to contain “2 grains of gold” when actually this quantity of gold chloride, as supplied in sealed glass tubes, is meant.

Gold-Platinum Toning—a method used to give black tones on collodion papers, first toning quickly in a gold bath and then, more thoroughly, in one containing platinum.

Gradation—the range of tones from clear glass to heavy deposit in a negative, or black to white in a print. Gradation is long or short, according as there are many or few distinct tones.

Grain—granularity due to coarseness of the substance of which image of a negative or print is composed or to faults in manipulation. In copy negatives (q. v.) made from prints, etc., grain is obtained more pronounced by strong side lighting which exaggerates the natural grain of a paper original.

Ground-Glass—the ground-glass focusing screen at the back of a camera.

Gum-Bichromate—a printing process in which the paper is coated with bichromatized gum carrying a pigment, offering wide possibilities of control and giving pictorial results when properly handled.

Gum-Platinum Process—of first making a light print on platinum paper, then coating the print with sensitive gum mixture and reprinting from the same negative.

H. & D. (Hurter and Driffeld)—used as a prefix to numbers signifying the speed of plates measured by the system devised by these investigators. Fastest plates, H. & D. 400 to 500. Medium speed, about H. & D. 200; slow, H. & D. 50 to 100.

Halation—spreading of light parts of the subject on

to darker where the two are strongly contrasted in juxtaposition (in a photograph). Due mainly to reflection of light from the back of the plate. See, also, Irradiation.

Half-Plate—in Britain the most popular size of plate ($6\frac{1}{2} \times 4\frac{3}{4}$ inches) for view cameras.

Half-Tone Screen—diamond-ruled screen of single or crossed lines used in photo-engraving.

Half-Tones—parts in a negative or print representing parts of the subject lighter than the shadows but darker than the highlights.

Half-Watt Lamps—nitrogen-filled metallic-filament electric lamps (nitro lamps) usually go by this name in Britain.

Halides—compounds of metals with the halogen elements, chlorine, bromine, and chlorine, e. g., silver chloride, bromide, and iodide are silver halides.

Halogens—the elements chlorine, bromine, iodine, and fluorine. Of importance in photography from their silver compounds.

Hardening Baths—of alum, formaline, etc., which exert a toughening and tanning action in gelatine, rendering it more or less completely insoluble in water.

Hardness—in negatives and prints. Excessive contrast—chalkiness. Shadow portions, without detail in them, and lighter half-tones, too light.

Hard-Working—plates or papers which by ordinary treatment yield negatives or prints of more than ordinary vigor or contrast. Applied also to developers which yield similar results.

Harsh—equivalent to "hard" in description of negatives and prints. See Hardness.

Head Screen—a circular screen of muslin, about 3 feet diameter, used for reducing and diffusing illumination on the sitter, in portraiture.

Heliographic Processes—a generic name given to various sun-printing methods for reproducing plans, designs, drawings, etc., by the ferric and allied processes.

High-Key—a style of photographic print (portrait or landscape) consisting entirely of light tones, differing little from each other in depth.

Highlights—in a subject photographed, the brightest parts, hence, the densest parts of a negative.

Hood, Lens—the detachable rim of a lens-tube somewhat larger in diameter and carrying the lens-cap. Also any separate device of tubular box- or bellows-form fitted to the lens-tube, to screen the lens from strong light.

Hopping—a mode of applying pigment in the oil or Bromoil process, consisting in short tapping to vertical strokes of the brush. Lightens light tones and strengthens dark ones.

Hydrometer—an instrument for measuring the specific gravity, and hence the strength, of solutions used in compounding developing solutions, etc.

Hyperfocal Distance—the distance from the camera to which an object can be brought without becoming unsharp on the plate, the camera being set at focus on infinity (q. v.). Numerically, it is equal to the focal length of the lens used, multiplied by itself and by 100 and divided by the f number in use.

Hypo. (Hyposulphite of Soda), (called thiosulphate of soda by chemists)—the fixing salt universally used in photography.

Hypo-Alum Toning—immersed in a heated mixture of alum and hypo, bromide and D. O. P. prints attain a purple-brown hue.

Hypo Eliminators—chemical destroyers of hypo, such as permanganate, persulphate, percarbonate, which convert any hypo remaining in prints or negatives, after washing, into other compounds, assumed to be without prejudice to permanence.

ICONOMETER—a view-meter of “direct-vision” pattern, i. e., consisting of an open frame with an eyehole or lens fixed behind it.

Illuminating Power—that property of a lens by which it forms some kind of image (not necessarily sharp throughout)—distinct from covering power (q. v.). The disc so filled by the image is called the “circle of illumination,” and is usually larger than the diagonal of the plate which the lens is listed to cover.

Image—the picture or record of the subject projected

by the lens on the focusing screen of the camera. Also applied to the material of the picture on a negative or print, e. g., silver image by development. See Latent Image.

Infinity—a very great distance, as compared with the focal length of a lens, say 200 to 500 times the focal length of the lens.

Infinity Catch—a device on a hand camera which automatically locks the lens in the position of focus on very distant objects.

Intaglio Printing—any method of printing from an engraved metal plate in which the shadows of the subject are represented by depressions in the plate, e. g., photogravure, rotogravure.

Intensification—a process for increasing the density and (usually) the contrast of a negative or print.

Intensity (of lens)—its speed, as denoted by the largest f number (q. v.).

Iris Diaphragm—a form of lens diaphragm modeled on the iris of the eye, formed of a number of thin leaves or plates which can be moved to yield a series of circular apertures from large to small.

Isochromatic. See Orthochromatic.

Irradiation—spread of light from one particle to another in the emulsion and causing effects in the shape of halation (q. v.) somewhat resembling those arising from reflection of rays passing through the plate back to the emulsion coating.

K Screens—yellow light-filters prepared with the dye filter-yellow K.

Kallitype—a process of printing with sensitive iron compounds in conjunction with silver salts.

Kinemacolor—a two-color process of motion-picture photography.

Kits—frames for holding plates of smaller size in plate-holders, etc. Not known by this name in Britain where they are termed "carriers."

Kodachrome—a process which gives a color transparency, consisting of two dyed color-plates, i. e., a red and a green positive, bound together and yielding exceedingly rich color-effects.

Kromskop—a viewing instrument, and also a lantern attachment, invented by F. E. Ives for the production of color reproductions by optical means.

LANDSCAPE Plate—a dry-plate of slow speed; used more in copying and reproduction than in landscape photography.

Lantern Slide—a small transparency for use in an optical or magic lantern; otherwise called a diapositive. In U. S. $4 \times 3\frac{1}{4}$ inches; in Great Britain $3\frac{1}{4} \times 3\frac{1}{4}$ inches.

Latent Image—the photographic image; the effect of light, produced by the exposure of a plate, film, or paper in a camera or otherwise, which is invisible until the film, plate, or paper, has been treated with a "developer."

Latitude—the property of dry-plate or paper to yield a good negative or print when more or less than the correct exposure is given.

Lens Shutter—not, commonly, any shutter on a lens, but only one forming part of the lens tube or mount, i. e., of the diaphragm or between-lens type.

Light Filter—any screen of colored glass, stained film, or solution used with the lens, which absorbs rays of certain colors and allows others to pass. See Ray-Filter.

Light Trap—any device for preventing light passing through the aperture in which a moving part of an apparatus works—example, the slot of a plate-holder carrying draw-out shutter, the light-trap for which is two opposing thicknesses of thick-pile velvet.

Linear Enlargement—the basis of enlargement by line, not by area, e. g., 4×5 to 8×10 is linear enlargement of 2, though 4 times on an area basis.

Limelight (Oxy-Hydrogen Light)—produced by directing a fine flame of hydrogen (or coal-gas) and oxygen on a cylinder of lime. Much less used since the introduction of electric arc lamps for lantern projection.

Litre (1000 ccs.)—a measure of volume in the metric system, equivalent roughly to 35 fluid ounces.

Liver of Sulphur—crude sulphide of potassium, potassa

sulphurata, used in throwing down silver from spent fixing baths in the recovery of residues.

Living Portraits—Prints showing changing expression; made by obtaining three separate records of a sitter, distributed as narrow bands in sequence over the negative by means of a ruled screen (against the plate) which is shifted slightly after each exposure. The print from the negative is viewed through a similar screen pressed against it and shifted to cause the change of expression.

Long-Factor Developer—one with high Watkins factor (q. v.). Such developers, e. g., metol, bring up all parts of image quickly and are commonly called "soft-working."

Low-Key—style of photographic print (portrait or landscape), consisting chiefly of dark shadow tones with comparatively little difference in depth between them.

MAGAZINE Camera—of box-form, holding six or twelve plates in place for exposure in the upper part, each plate falling, as exposed, into a lower chamber. A purely British type, still popular.

Magnification—in telephotography, means the number of times the image is enlarged by the whole telephoto lens in comparison with that formed by the positive lens alone. Such enlargement is reckoned "linear" (q. v.).

Magnifier—a supplementary lens for attachment to the camera objective, shortening its focal length and allowing nearer objects to be focused without altering the distance between objective and plate.

Magic Photographs—prints, the pictures on which have been rendered invisible by bleaching, but are made visible again by simple treatment, e. g., by heating by exposure to light, or by hypo or ammonia.

Meniscus—a lens which is concave on one surface and convex on the other; the simplest form of photographic lens.

Micro-Photographs—minute diapositives, e. g., $\frac{1}{8}$ -inch diameter, which are cemented to a small high-power magnifying lens through which they can be

viewed. A Parisian novelty for insertion in pen-holders or souvenirs.

Mixed Jet—for oxy-hydrogen light (q. v.) in which both gases are supplied under pressure and mix before emerging into the lime cylinder.

mm. (millimeter)—focal lengths of many Continental lenses—and diaphragm apertures of some few—are marked in mm. 100 mm. = 4 inches (very nearly).

Monochrome—in one color, but applied both to black-and-white and toned photographs, as distinguished from those in two or more colors.

Mottling—irregular riblike markings in negatives, usually as result of omission to keep developer in motion.

Mount, Lens—the tube or barrel in which the glasses of a lens are fixed. See, also, Focusing Jacket.

M.-Q.—Metol hydroquinone (quinol) developer.

Multiple-Coated Plates—dry-plates consisting of two (or, at most three) coatings of emulsion, the upper of high speed, the lower slow. For the prevention of halation and latitude of exposure.

Multiple Mounting—a system of mounting prints on several thin papers, adjusted as to size so that they provide a series of borders. See, also, Border Tints.

Multiple Photography—making of several portraits of a sitter on one plate, at one exposure, by means of mirrors behind and to the side of the sitter; also the making of a number of separate portraits, each at a different exposure, by masking parts of the plate in a special form of plate-holder known as a multiple holder.

NARROW-ANGLE Lens—of great focal length in relation to the size of the plate, e. g., 20 inches for a 5 x 7 plate, hence including a narrow view-angle.

Negative—any photographic result in which light and shade are reversed, as compared with the subject, i. e., light parts dark, and *vice versa*.

Negative Lens—of concave type and bending rays further apart instead of converging them to a focus.

Negative Paper—of fine grain and coated with sensi-

tive emulsion. Used as a light, flexible, and cheaper substitute for dry-plates.

Nernst Lamp—an electric lamp with stout filaments of refractory material which becomes a conductor when heated. Thus, slow in lighting up but of exceedingly constant intensity.

Nitro Lamps—metallic filament (tungsten) electric bulbs filled with nitrogen or helium gas. The much greater thickness of filament allows powers up to 4000 c.p., with economy in current.

Nodal Points—of admission and emergence. Also called "principal points," "Gauss points." Imaginary points (in or near a lens) in reference to which the action of a lens may be traced on the basis that all rays pass out from one point as though they had entered at the other.

Non-Filter. See Anti-Screen.

Non-Halation—plates or films so made as not to produce the effect known as halation (q. v.).

Non-Stress—applied to printing paper (or developer therefor) which does not give rise to stress marks (q. v.).

OIL Process—of making print by exposure of bichromated gelatine-coated paper under the negative, washing and then producing the picture by "pigmenting" with greasy ink.

Oil Transfer—an impression on plain paper made from a fully pigmented oil-print.

Omnicolore Plate—a screen-plate (q. v.) for color photography, of regular geometrical pattern.

One-Solution—a one-solution developer means one which is kept in a single solution. One-solution intensifier (or toner, reducer) means one which *acts* in one operation (an important distinction). It may be compounded from two or more "stock solutions."

Opaline—a print squeegeed to glass, and, usually, backed up with an ornamental paper border.

Opaque Projection—of solid objects (prints, apparatus, etc.) by strong illumination, which is reflected through a condenser and thence to a projection lens. See, also, Aphengoscope.

- Open Aperture**—the largest stop or diaphragm fitted to a lens.
- Open Arc**—an arc lamp with the arc unenclosed, as distinguished from enclosed arc (q. v.).
- Open Landscape**—a scene without any pronounced object in the foreground, e. g., fields, beaches.
- Optical Axis**—an imaginary line running through a lens at right angles to the surface on which the image is formed.
- Optical Contact**—that of surfaces united by thin layer of cement or by other means so that there is no air-space between. Example, glasses which form a single lens (q. v.).
- Optical Sensitizers.** See Color Sensitizers.
- Orthochromatic**—applied to plates which are rendered color-sensitive to such a degree that they are affected fairly actively by green and yellow rays.
- Orthoscopic (Rectilinear)**—denotes a lens which forms a reproduction in correct proportions.
- Over-Development**—development for too long a time.
- Ozobrome Process**—of making a carbon print through the medium of a bromide print and without exposure to light. The bromide is treated with a special bleaching solution and then laid in contact with the carbon tissue.
- Ozotype**—a process of carbon printing in which a faint image on bichromated paper is made to yield, by contact, a print on carbon tissue. Supplanted by Ozobrome process.

PAGET Process—of color photography. A panchromatic plate is exposed through a special three-color screen; a diapositive is printed from it and bound up in register with a similar three-color screen, giving a transparency in colors.

Palladiotype—a printing process similar to Platinotype (q. v.), but using palladium metal in place of platinum.

Panoram Camera—one including an extremely wide angle of view up to whole horizon (360°). In the Panoram kodak, the lens moves in relation to curved film; in the Cirkut camera, the camera and lens

rotate, while the film travels in the focal plane of the lens.

Panchromatic—descriptive of plates rendered sensitive to rays of all colors.

Papier Joseph—soft, silky paper, used for cleaning polished glass surfaces.

Papier Mineral—semi-transparent paper, used to carry brush and stump work on back of negative in modifying tones of latter.

Passe Partout—a method of protecting prints for wall-display, consisting of binding the mounted print to a glass of the same size as the mount, the latter having rings attached to it for suspension of the whole "passe partout" on a wall.

Pellet Process—Plan-copying process also called Cyanographic (q. v.).

Periscopic Lens—originally a very wide-angle lens (periscopic=seeing all round). In Britain it now denotes a cheap form of non-achromatic lens (q. v.) largely fitted to low-price hand cameras.

Photo-Aquatint—a name applied to the Gum-bichromate process (q. v.); also to Photogravure (q. v.).

Photogram—a name suggested in place of photograph; used as a noun.

Photogrammetry—a system of surveying by means of the camera, i. e., photographing buildings, estates, or territory under optical conditions such that dimensions can be read off from the photographs.

Photogravure—a photo-mechanical process (q. v.) in which a negative carbon transparency is transferred to a grained copper plate which is then etched in a bath of iron perchloride.

Photo-Lithography—ordinary lithography, with the difference that the design on the litho stone is not produced by hand, but by sensitizing with bichromated albumen and printing thereon from a photographic negative.

Photo-Mechanical Plate—a dry-plate of very slow speed, yielding great density without fogging or veiling of least-exposed parts.

Photo-Mechanical Processes—methods of preparing by photographic means surfaces from which impressions

of the subject so reproduced can be taken by mechanical means, e. g., half-tone, collotype, photogravure, rotogravure, etc.

Photometer—an instrument for comparing intensities of light and thereby, in scientific photography, measuring densities in negatives.

Photo-Micrography—a method of making greatly magnified photographs of small objects by means of the microscope in conjunction with a camera.

Photo-Sensitive—sensitive to light, i. e., altered, decomposed, or affected by exposure to light.

Photo-Telegraphy—the transmission of drawings, designs, or photographs over long distances by combined electrical and optical means.

Physical Development—the building up of an image on negative or print by the deposition upon it of silver from the “developing” solution. Development in the wet-collodion process is of this type, which is akin to intensification.

Pinatype—a process for obtaining a print, or diapositive, the image of which consists of dye. A gelatine-coated plate is sensitized with bichromate, exposed under a diapositive, washed and soaked in a (pinatype) dye, when impressions of the picture can be taken on paper.

Pincushion Distortion—by a single lens. See Curvilinear Distortion.

Pinhole Photography—the use, in place of a lens, of a hole (1-20th to 1-60th inch diameter) in thin opaque paper or metal foil.

Pinholes—minute clear spots in a negative, due to dust on the plate before development or to tiny bubbles of air on the film when immersed in the developer.

Pint—in United States 16 fluid ounces; in Britain, 20 fluid ounces.

Plane—flat surface, e. g., plane of the image formed by a lens, i. e., focal plane (q. v.). Also flat (adjective).

Plane-Parallel—in reference to glass plate (e. g., light-filter), the two surfaces of which are both flat and parallel to each other.

Plano-Concave Lens—flat on one surface, concave on the other. A negative lens.

Plano-Convex Lens—flat on one surface, convex on the other. A positive lens.

Plate Adapter—an accessory permitting the use of plates in roll film cameras.

Plate Holder—a light-tight shallow case holding one or two plates for exposure in camera. In Britain termed "dark-slide" (q. v.).

Plate-Sunk—description of pasteboard mount for photographs with a slightly sunken center, in the style of an engraving or etching.

Platinotype—semi-print-out process in which paper coated with sensitive salts of iron produces on development an image in metallic platinum. Prints may be black or sepia and are permanent.

Pneumatic Holder—rubber bulb formed flat at the end where the aperture is. Serves for holding plates when varnishing, etc.

Pneumatic Release—an exposure shutter release operated by air-pressure provided by the compression of a rubber bulb.

P. O. P. (Printing Out Paper)—an abbreviation first used (in Britain) for gelatine print-out paper.

Portrait Attachment—a supplementary lens attached to the camera objective, shortening its focal length sufficiently to enable a near subject, such as a portrait, to be rendered sharply.

Powder Process—a method of printing, the basis of which is that a film of bichromated gum, after exposure under a negative, attaches any fine powder (applied to it) in the parts unaffected but repels the powder in degree proportional to the action of light. Produces a negative from a negative.

Printing—the making of a positive from a negative (or *vice versa*) by the exposure of a sensitive surface to light behind (and in contact with) the negative.

Printing Frame—for holding negative and sensitive paper (or plate) in contact during exposure to light.

Printing Machine—a development of the printing frame by which contact of negative and paper is quickly obtained by a pressure board, the operation of which also begins the exposure to light, which continues until pressure is released.

Printing In—the insertion of part of the subject of one negative into a print from another, i. e., combination printing (q. v.).

Printing Out—a type of printing paper with which print of full depth is obtained by exposure to light, e. g., Solio.

Process—a term used to embrace the technique of all photo-mechanical processes (q. v.).

Process Plate. See Photo-Mechanical Plate.

Proxylene—nitrated cotton, made by soaking cotton in a mixture of nitric and sulphuric acid. Base of collodion. Also called nitro-cellulose, collodion wool, soluble guncotton.

QUARTER-PLATE—size of dry-plate ($3\frac{1}{4} \times 4\frac{1}{4}$ inches). A whole-plate being $6\frac{1}{2} \times 8\frac{1}{2}$ inches.

q. s. (quant suff)—in formulas, denotes the use of sufficient of a chemical to produce a particular result.

RANGE-FINDER—an optical device for ascertaining distance of an object. Embodied, as a focusing adjustment, in certain Eastman cameras.

Rapid Rectilinear Lens—a doublet lens consisting of two double cemented components, each, usually, of the same focal length. The “speed” of the whole lens is about $f/8$.

Rapid Symmetrical Lens—a rapid rectilinear lens, each half of which is of same focal length and construction.

Rapidity—as applied to plates, lenses, and shutters. See Speed.

Raw Paper (Raw Stock)—uncoated paper used in the manufacture of photographic printing papers. Usually first coated with Baryta (q. v.).

Ray Filter (Ray Screen)—a screen of yellow glass or dyed film, serving to absorb rays of blue and violet colors, the remainder passing through. Also termed orthochromatic and isochromatic screen.

Re-Development—the treatment of a bleached negative or print with ordinary developing solution, the action of which (usually) is to re-convert the white

image into one of black metallic silver. See Bleaching Baths.

Red Prussiate of Potash (Potass. ferricyanide=ferricyanide of potash).

Reducer—a solution which reduces the density of a negative, usually by dissolving away part of the silver image. Chemically, such a solution is an oxidizing one, the opposite, in the chemical sense, of reducing.

Reducing—operation of weakening or reducing the density or depth of negative or print.

Reflex Camera—one in which the image formed by the lens is reflected by a mirror onto a focusing screen, placed, as a rule, in the top of the camera whilst the plate faces the lens. On release, the mirror rises, and the shutter then exposes the plate.

Register—of plate-holder. The distance of the plate, when in holder, from the front outside surface of latter. Should be the same as that of the front surface of focusing screen from the surface of the frame in which it is mounted.

Relative Aperture—of a lens in relation to its focal length. Numerically, its focal length divided by the diameter of the diaphragm aperture. The measure of the speed of a lens. See *F* Number; also Working Aperture.

Repeating Back—a sliding frame at the back of the camera, carrying both focusing screen and plate-holder and allowing of different exposures being made on different sections of a plate.

Residues—silver, gold, or platinum recovered from spent photographic solutions, chiefly fixing and toning solutions, commonly called "wastes."

Resolving Power—the property of a sensitive plate to render minute detail sharply.

Restrained Development—the result of an excess of potass. bromide added to the developing solution.

Restrainer—a substance (usually potass. bromide) which slows down the speed of development.

Reticulation—a minute irregular pattern, consisting of corrugations of the gelatine, which is an occasional defect of negatives, due to temperature differences.

Retouching—improving the tones and texture—and often the outlines of the subject—in a negative by touching with a pencil or shaving with a knife.

Reversal (in negatives)—the production of a positive instead of a negative, or *vice versa*, e. g., by gross over-exposure or chemical means, e. g., dissolving the negative image and then developing remaining emulsion.

Reversed Negative—one in which the subject is reversed as regards right and left.

Reversing Back—a loose, square-back frame of a camera, carrying the plate-holder and focusing screen. It permits of the plate being used either vertically or horizontally (as required by the shape of the subject) without turning the camera over.

Rising Front—The front or lens-board of the camera, which can be raised or lowered. A useful amount of rise is $\frac{1}{3}$ to $\frac{1}{2}$ the height of the plate; of fall, $\frac{1}{4}$ to $\frac{1}{2}$.

Roller-Slide—British term for roll-holder.

Roll Film—thin celluloid coated with light-sensitive emulsion and wound, with a protective paper strip, on a spool for use in hand cameras. Extra length of the paper at each end allows of the sensitive band being drawn into position for exposure (and withdrawn when the whole length has been exposed) in daylight.

Roll-Holder—a separate chamber for the exposure of roll film, which can be attached to any camera, and so allows film to be used in cameras not specially made for it. Now (1918) largely gone out of use.

Rotating Back—a carrier frame for the focusing screen and plate-holder at the back of the camera. It is “revolvably” mounted on the back, whilst a Reversing Back (q. v.) is loose.

Rotating Stops—a form of lens-diaphragm in which apertures in a rotating metal disc can be brought in turn centrally in the lens-tube.

Rotogravure—a process of photogravure (q. v.) in which the engraved plate is of cylindrical form affixed to a roller, and is printed in a rotary machine.

Rotary Photography—a system of exposing, developing, and fixing prints in large quantities, in which a band of sensitive paper travels under a set of negatives for

exposure, and thence through the chemical baths, drying machine, etc.

Russian Vignettes. See Black Vignettes.

SAFE Edge—an opaque coating on the margins of a negative. It obstructs the action of light and is necessary in carbon printing.

Safe-Light—a screen used in the darkroom lamp to supply a yellow, red, or green light, according to the sensitiveness of the plate or paper. Of glass or (more usually of late years) of dyed gelatine films between glass plates.

Satista—a semi-print-out paper, rendered sensitive with iron salts, and yielding prints the image of which consists of silver and platinum. Similar to platino-type in manipulation and results.

Saturated Solution—one which will dissolve no more at a given temperature.

Saturator—a carburetor for mixing oxygen with ether vapor, the mixture replacing hydrogen or coal-gas in use of limelight (q. v.). Now nearly obsolete.

Scale Focusing—by judging distance of the subject and setting the camera extension by the focusing scale (q. v.) provided.

Screen-Plate (Color)—a plate coated with a minute irregular or regular pattern of color-patches (red, green, and blue-violet), with a coating of emulsion over it. For direct color photography, e. g., Autochrome, Omnicolore, Paget.

Self-Capping Shutter—provided with automatic closure of its aperture when being rewound or reset for a further exposure.

Self-Developing Plates—dry-plates containing developer on the back or in the emulsion.

Self-Toning Paper—printing-out paper which contains the gold required for toning it, the latter acting when the print is put in a hypo fixing bath.

Sensitometer—an instrument for measuring the sensitiveness of dry-plates.

Sensitometry—the measurement of properties of dry-plates, etc., such as sensitiveness, power, and speed of yielding gradation, density, etc.

Separable Lens—a doublet lens, each component of which can be used as a separate lens.

Sepia Paper—plan-copying paper with a coating of sensitive iron salt, also containing silver. Yields a reddish sepia color on fixing in weak hypo.

Sepia Toning—by the hypo-alum process (q. v.) or by bleaching and treating in a bath of sulphide.

Shadows—in a negative, the clearest (thinnest) parts; in a print, the darkest parts.

Sheaths—light metal holders for plates exposed in magazine cameras (q. v.) or changing boxes (q. v.), or for the use of flat films in plate-holders.

Short-Factor Developer—one with low Watkins factor (q. v.). Such developers, e. g., hydroquinone, yield density very readily and are commonly known as "hard-working."

Short Stop. See Stop Bath.

Side Swing—a movement of the camera-back about an upright axis, so that the back is at an angle with the front (instead of parallel with it) when looking down from above.

Single Lens (or "landscape")—of two or more glasses cemented together in optical contact (q. v.), as distinguished from a doublet, which consists of two such "single" lenses with the stop between them. Generally used in low-priced hand cameras.

Single Transfer Paper. See Transfer Paper.

Sizing—the process of filling up the pores in paper by a coating of arrowroot, gelatine, etc.

Sketch Portraits—made against a white background on which (in the print) slight details are introduced by hand or by printing from another negative.

Sky Shade—a screen, on the shutter or lens-tube, which cuts off part of the light from the sky.

Slit-Width. See Curtain Aperture.

Soft—applied to negatives and prints to indicate lesser degree of contrast, but not so much as to be called "flatness."

Soft-Working—plates or paper which, by ordinary development, etc., yield soft negatives or prints. Applied to developers yielding similar results.

Solarized—commonly used to describe the bronzed

metallic appearance of the shadows in prints greatly over-printed.

Solid—applied to prints or enlargements made to include the background existing in the negative as distinguished from vignetting. Plate-holders—of the American one-piece pattern, not the opening, hinged type of the British “dark slide.”

Spectacle Lens—of one glass only, therefore non-achromatic and (from its lack of covering power) requiring to be of relatively long focus to cover a given size of plate.

Speed—of plate, film or paper—its sensitiveness to light. Of a lens—its largest effective or relative aperture (smallest f/Number). Of a shutter—shortness of time of exposure it can give.

Sp. Gr. (Specific Gravity)—weight in comparison with an equal bulk of water. See Hydrometer.

Spherical Aberration—the inability of a lens to bring rays passing through its center and edge to the same focus. Causes general unsharpness, but is remedied by using a smaller stop.

Spirit Sensitizer—for carbon tissue. Bichromate solution made with aid of alcohol, spirit or acetone, and permitting of the tissue being dried, for printing, within a few minutes.

Spool-Holder—a film-camera device for holding the cartridge or roll-film. In some cameras, a detachable fitment.

Spotting—touching out light spots in negatives or prints to match adjacent portions.

Square—of a number. The number multiplied by itself, e. g., “2 squared” = 2×2 . Written 2^2 .

Squeegee—a stout strip of rubber cemented in a grooved wooden holder, or roller covered with rubber, for pressing prints, e. g., when glazing them on glass or before hanging to dry.

Squeegee Pad—a piece of celluloid or ferrotype plate used for glazing prints by stripping therefrom.

Stand Development—the development of plates with a weak solution acting for a much longer time. Plates are usually placed upright in a tank and are taken out when seen to be of sufficient density.

- Stand Developer**—any weak developing solution used for a long time, say, 1 hour or more, the plates being contained in a tank.
- Stereoscope**—an instrument by which specially prepared photographs may be viewed so as to present the object photographed in its natural relief.
- Stereogram**—a stereoscopic photograph.
- Stop.** See Diaphragm.
- Stop Bath**—for checking the action of another photographic solution, e. g., of sulphite for gold toning.
- Straight Photograph**—one made from the negative without any touching up of the latter by hand or chemical means (except, perhaps, spotting), or any shading or faking during printing.
- Streamer Markings**—bands of extra density (in negatives) running from narrow dark objects, e. g., chimneys. Due to stagnant tank development.
- Stress Marks**—scummy appearance or black lines on a bromide or D.O.P. print, caused by (among other things) the sensitive paper being rubbed against the negative or other sheets of paper, or any sharp pressure.
- Stripping Film**—a flexible sensitive film of emulsion on a support of paper, etc., from which it is afterward stripped off. Almost obsolete.
- Stripping Solution.** See Glazing Solution.
- Strip Printing**—a system of making several (usually six) exposures on a strip of bromide or D.O.P. paper, each strip, after development, fixing, etc., being cut up into single prints.
- Strong Developer**—one made up with little water, either when dissolving the chemicals or when mixing the stock solutions for use.
- Subject Factor**—the multiplier used in calculating exposure; the time required for, say, an open landscape (q. v.) being halved, doubled, trebled, and so on, for subjects of different character.
- Substratum**—an under-layer, e. g., Baryta beneath the emulsion on printing papers.
- Sulphide Toning**—obtaining a brown to sepia tone on bromide or D.O.P. prints by converting the silver image into silver sulphide, usually by first bleaching

the print and then placing in sulphide solution. The hypo-alum process (q. v.) is a direct form of sulphide toning.

Sulphur Toning—the impermanent toning effect which results when print-out prints are fixed in a bath of hypo which is acid.

Supplementary Lens—an extra lens used to lengthen or shorten the focal length of the ordinary camera lens.

Surface Processes—methods of mechanical printing from a flat surface as distinguished from one etched in relief or in Intaglio (q. v.). Collotype and lithography are surface processes.

Swing Back—a back of a camera which can be inclined to form an angle with the front when viewed from the side. Permits of the back being kept upright when the camera is pointed upward or downward.

Swing Front—a front of a camera which is mounted so that the lens can be pointed upward or downward independently of tilt of the whole camera.

Symmetrical Lens—one (of doublet type) in which each component is of similar construction and the same focal length.

T—marking on shutters signifying “time.” See Time Exposure.

Tank Development—in a tank with vertical grooves or racks for the plates. Usually the developing solution employed is of about quarter strength and often used by “time.” See Time Development.

Telemeter—an instrument which tells the distance of objects.

Telephoto Lens—one which gives a large image of a distant object with a relatively short camera extension. It consists of a negative or diverging lens placed behind the ordinary positive lens, the negative element magnifying the image is formed by the positive element.

Temporary Support—varnished paper to which the print is transferred, in the carbon process, for development and from which it is afterward removed to the final support.

Thermo Development—a modification of the factorial system, adjusting the time of development in negative-making in accordance with the temperature of the developer, obviating the need for inspecting the negatives during development.

Three-Color Process—a system of reproducing colors by dividing the rays of light from the subject into three sets, each of a given color, recording these on sensitive plates, and from the negatives preparing positives which are used, stencil-fashion, to produce the mixture of colored rays (from suitable sources) required to re-form the original colors. Practically all methods of "color photography" are on this system.

Tilting Table—an attachment to the head of a tripod stand with adjustments for tilting camera.

Time Development—developing for a fixed time (usually in a tank) at a given temperature, instead of judging the end of development by the appearance of the negatives.

Time Exposures—those of such length that they can be given by hand-operation of the cap or shutter, e. g., a half-second and upward. On a shutter, "time" indicates a setting whereby exposure begins at one actuation of the shutter-release and continues until the release is again operated to close the lens.

Time Exposure Valve—a device for the pneumatic release (q. v.) of an exposure shutter which can be set to give automatically any exposure of the series $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, and 3 seconds.

Tintypes—direct portraits on metal by the ferrotype process (q. v.).

To make—in formulas, indicates that the chemicals are first to be dissolved and the solution then made up to a given volume with further water.

Tone—used to denote color, e. g., sepia tone. Also depth or intensity of any part of a photograph, e. g., "light tone," in which use of the word there is no reference to color.

Toning—most commonly, changing the color of a print or diapositive.

Transferotype—a special bromide paper, the film of

which can be stripped from its paper support to glass, etc., after manipulation.

Transfer Paper—used in carbon printing and coated with hard gelatine or with varnish, according as the print is to remain permanently or temporarily on it. The former is single-transfer paper, or final support; the latter is double-transfer paper, or temporary support.

Triple Extension—a camera adjustment which allows of a distance between focusing screen and lens-board of roughly three times that which is required in ordinary work with a lens a little longer in focus than the long side of the plate. Obtained by providing two separately racking baseboards, with, also, in some patterns, a baseboard which racks out toward the rear.

True-To-Scale Process—of copying a tracing by laying a blueprint (made from it), while undeveloped and unwetted, upon a special hectograph jelly. The impression is inked up and pulls taken from it.

Turntable—a camera adjustment consisting of two metal rings, one fitting (free to rotate) closely within the other. The outer is screwed flush with the under side of the baseboard and the legs of the tripod are attached to the inner ring. The camera can thus be turned on the tripod and fixed by a clamping screw.

Twin-Lens Camera—fitted with two identical lenses, by one of which the image is formed on a focusing screen (where it can be seen and focused) whilst the other (which moves with the first when focusing) projects the image on the plate.

Two-Color Process—system of reproducing colors similar to that of three-color process (q. v.) but dividing light from subject into two portions only. See Kodachrome Process.

ULTRA-VIOLET Rays—those lying beyond the blue-violet end of spectrum, i. e., invisible to the eye, but of great actinic power.

U. S.—denotes the "Uniform System" of diaphragm or stop numbers according to which $f/4$ is 1; $f/5.6$, 2; and $f/8$, 4, and so on.

VEIL—less pronounced form of fog (q. v.).

View Finder—miniature camera or lens (or arrangement of lenses) serving to show on a smaller scale the picture obtained with the full-sized instrument to which it is fitted. See, also, Brilliant Finder.

View Lens. See Landscape or Single Lens.

View-Meter—an instrument, usually consisting of a bar fitted with an eyepiece (or lens) and sliding frame, by which the views included on a given size of plate, with lenses of various focal lengths, can be seen.

Vignetting—shading off the margins of the subject in a print to white by placing a card with serrated aperture a short distance in front of the negative when printing, or by similar means. Applied to negatives by using a serrated card in front of the lens. See Black Vignette.

Visual Focus—the point at which the rays most perceived by the eye, viz., green and yellow, meet after passing through a lens.

V. P. (Vest-Pocket)—size of camera, most commonly 45 x 60 mm. = $1\frac{3}{4}$ x $2\frac{3}{8}$ inches, but the name is applied to other pocket cameras.

WASHED Emulsion—of gelatine or collodion from which substances, resulting from the interaction of chemicals in forming silver bromide (chloride or iodide), have been removed by washing emulsion in water.

Waterhouse Stops (Diaphragms)—loose metal plates, each with a circular aperture therein, which are inserted through a slot in the lens-tube. Now supplanted by Iris diaphragm.

Watkins Factor—a numerical multiplier denoting the number of times the “time of first appearance of the image” which a plate must be developed according to the factorial system (q. v.). Varies with different developers.

Watkins Power No.—the rating of pinholes as means of calculating exposure in pinhole photography (q. v.). The Number is a denominator of a fraction (of inch) expressing the diameter of the pinhole x 6.3.

Weak Developer—the developing solution diluted with water.

Wet Collodion Process—in this process a glass plate is coated with collodion containing iodide, rendered sensitive with silver nitrate, and exposed whilst wet.

Whole-Plate—size of plate ($6\frac{1}{2} \times 8\frac{1}{2}$ inches).

Wide-Angle Lens—one of focal length short in relation to size of plate, e. g., 4 or 5 inches for 5×7 -inch plate.

Wide-Angle Movement—a camera adjustment by which the back can move close up behind the lens-front as required for short-focus lens. See, also, *Falling Front*.

Woodburytype—obsolete photo-mechanical process in which prints were taken in gelatine ink from a lead mold cast from a photographic relief.

Working Aperture—relative aperture (q. v.) of lens as modified (reduced) by greater extension of camera when photographing objects nearer than “infinity.” (q. v.)

Working Solution—any developing, toning, or other bath as actually applied to plates, prints, etc., i. e., after mixture and dilution of stock solutions.

YELLOW Prussiate of Potash—potass. ferro-cyanide or ferrocyanide of potash.

ZONAL Aberration. See *Coma*.

GEORGE E. BROWN.

Notes and Comment

THE ARMY SCHOOL of Aërial Photography at Rochester, N. Y., referred to in THE PHOTO-MINIATURE No. 168, began its course of instruction a few days ago, with about 600 students at the opening session. All amateur and professional or commercial photographers are urged to join this branch of the service, as 1,000 men are needed each month. Men not registered for the draft, who desire to join as photographers, should write to the Air Division, Personnel Department, 136 K Street, N. E., Washington, D. C., for information as to enlistment, sending evidence of their qualifications. Those who are registered for the draft should apply to their Local Board.

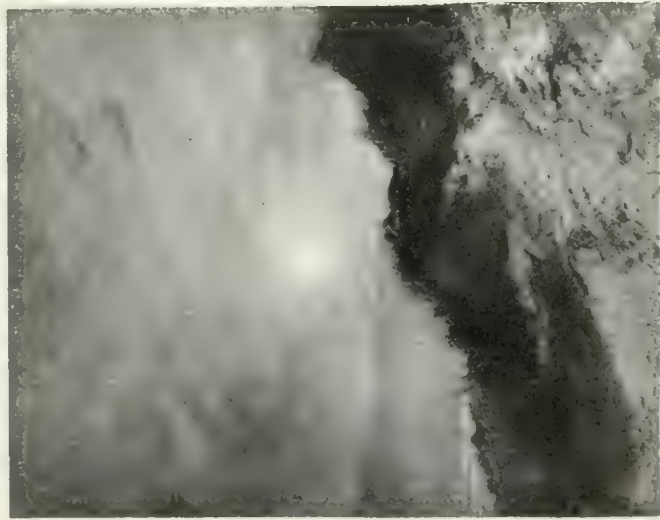
A CATALOGUE OF OFFICIAL WAR PHOTOGRAPHS and Stereopticon Slides, issued by the Division of Pictures, Committee of Public Information, Washington, D. C., has been received. It covers the prints and slides issued from October 25, 1917, to January 31, 1918, about 5,000 in all, covering many varied phases of war activities here and abroad. The prints are $6\frac{1}{2}$ x $8\frac{1}{2}$ inches, on heavy paper, and are sold to collectors at 10 cents each; lantern slides at 15 cents each. The Catalogue may be consulted at any post office.

GET YOUR LICENSE. According to Federal Law H. R. 3932, all vendors and purchasers of flash powders, flash sheets, flash cartridges, magnesium powder, potassium bichromate, potassium permanganate, nitric acid, lead nitrate, silver nitrate, or compounds containing these ingredients, must secure a license authorizing the purchase, sale, or use of any or all of them. Copies of the law can be obtained from county clerks, or the Bureau of Mines, Department of the Interior, Washington, D. C.

THE BRITISH JOURNAL OF PHOTOGRAPHY ALMANAC, 1918, long delayed, is at last ready for those who want it. But the supply is smaller than ever before, and you must speak quickly if you would avoid disappointment, as there will not be sufficient to supply the demand.

In spite of all the difficulties due to wartime conditions in England, the Editor of the "Almanac," Mr. George E. Brown, has managed to turn out a bulky volume as strong in interest and usefulness as any of its predecessors. The principal feature of the book is a "Miscellanea of Negative Making" by the Editor. The other sections: Epitome of Progress; Apparatus and Equipment; Photographing Various Subjects; Negative Processes; Printing Processes; Color Photography; Photographic Societies; Formulary and Tables, have been carefully revised and brought to date. The advertising pages, about 400 in number, offer striking evidence of the indomitable courage, and consequent prosperity, of the photographic manufacturers of Great Britain in the face of the present difficult conditions—in strange contrast with the attitude of our American manufacturers, many of whom have ceased advertising "for the period of the war."

It would be idle to urge my readers to get the "B.J. Almanac," as, doubtless, all have already secured copies of this one indispensable reference book of the year. The American agents are George Murphy, Inc., New York City, but any dealer can obtain it for you and thus save you postage enough to buy a W. S. S. Paper covers, 75 cents; cloth bound, \$1.50. Postage extra.



Sunset—Conway Bay
Fred. Judge



The Special
Nichol Elliott



The Mystic Hour
J. M. Whitehead



SUNSET-WINTER
F. P. Cembrano



IN THE TRADES
Walter Clutterbuck



THE HAVEN
R. Dixey



UNTIL
THE
DAY BREAK.

UNTIL THE DAY BREAK
J. M. Whitehead



A. Horsley Hinton



THE HILLSIDE
Malcolm Arbuthnot



PLOMARCH
Robert Demachy

The Photo-Miniature

A Magazine of Photographic Information

EDITED BY JOHN A. TENNANT

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Number 170

Cloudland and Sky

Despite the invitation sent out by the War Department, asking photographers to contribute photographs of local war activities to the pictorial history of the Great War, now being compiled at Washington, the wise amateur will doubtless confine his use of the camera, "for the period of the war," to scenes and subjects as far remote from war activities as may be possible. Not that in this he will be following his natural inclination; far otherwise. But the widespread publicity given to arrests following the use of the camera in places where war activities are observable; the uncertainty as to local police and military regulations; and the drastic provisions of the Espionage Act of 1917, plainly affirm the wisdom of abstaining from any such general use of the camera out-of-doors as is suggested by the War Department. Perhaps the invitation needs official interpretation or explanation. In European countries, at present, the possession or use of a camera, without official permission, is absolutely prohibited within large areas, and many of the special uses mentioned in the letter from the War Department, printed elsewhere in this issue, are attended by heavy penalties. Be this as it may, the uncertainties and restrictions attending outdoor photography, in force here and abroad, clearly point to the special advantages of the present time for the intensive cultivation of fields of camera work wholly free from vexatious risk or restriction.

A Neglected Field

Such a field is dealt with in the monograph which follows, wherein the plea is made for a wider and more intelligent appreciation of the sky in outdoor photography. It is a field which has been woefully neglected by American amateurs, but one which offers wonderful possibilities in the making of better pictures. This being the ambition of every amateur worthy of the name, I am confident that the adventure here proposed will be welcomed as at once timely in interest and abundantly worth while at any time.

Why Neglected

Why are amateurs so generally unappreciative of the value of the sky in their pictures? It is a question difficult to answer in a word. An offhand opinion would pronounce it due chiefly to lack of thought and observation. We do not ride our hobbies as seriously as European amateurs do. Life subjects apart, in which the human interest is supreme, it is usually the beauty of a scene, or its esthetic interest, which tempts the amateur to stop and photograph what he sees in his walks abroad. And, more often than otherwise, the aspect of the sky at the moment plays an important part in the makeup or pictorial interest of the scene. In spite of which the amateur's prints all too often show an unending monotony of blank white spaces where the sky should be. It must be lack of thought, for the average amateur is wholly unconscious of his loss in this regard. Remind him of it, and he will probably exclaim: "I never thought of it." It is an ancient wail: "With desolation is the land made desolate, because no man thinketh in his heart."

Misplaced Confidence

There is another reason why the amateur is so contented with blank spaces instead of skies in his pictures. Thanks to skillful advertising, the beginner with the camera starts out with implicit faith in the capacity of his film or plate to give him at least a fairly complete record of whatever his eyes may see. So he is apt to accept, without further question, what his film gives him, so long as the record is fairly clear and well defined as to form and light and shade. But the average plate or film,

used in this unthinking way, will rarely tell "the truth, the whole truth, and nothing but the truth." Among other things, the sky in the scene will usually be missing, simply because to give the sky and the foreground or scene in one and the same negative presents a problem beyond the normal, unaided capacity of the sensitive film used. I have questioned many amateurs as to this point when asked to offer suggestions to help them improve their work. Their replies have almost invariably been characterized by this willingness to accept all unthinkingly what the film or plate gave them. "Yes, there *was* a lovely sky," etc., or "Yes, there were clouds in the sky at the time—but I didn't get them."

**Stirring up
Discontent** It is my plain purpose here to stir up a divine discontent in the heart of the reader, so that he will no longer tolerate the bare, unfurnished sky spaces which rob his pictures of so much interest and beauty. To this end I have set before him a few examples of everyday subjects, showing how largely the sky contributes to the pictorial attractiveness of the outdoor scene. These examples are reproduced from the pages of *The Amateur Photographer*, a veritable storehouse of pictorial material, the inspiration and usefulness of which is here gratefully acknowledged. I hope that the study of even these few examples will upset the reader's complacency as to the skies (or lack of them) in his pictures, and persuade him to a more enthusiastic appreciation of the splendid pageant of beauty passing all unseen over his head with the procession of the days. It is from such an appreciation only that the desire will come to get something of the loveliness of cloudland and sky into his pictures of the world out-of-doors.

**Awakening
Interest** Quite apart from its pictorial interest, it would be difficult to name a more interesting field for study and observation than the ever-changing panorama of cloudland and sky unrolling itself before our eyes as the seasons come and go. It has been well said that: "If we lived on a planet without atmosphere, such as our own satellite, and were suddenly carried to the earth and required to specify what, of all the wonderful things

seen, most excited our interest and admiration, we would be obliged, in perfect fairness, to reply: 'The floating reservoirs—the clouds.'"

But it is with the pictorial, and not with the scientific side of the subject that we are here concerned. Of the whence and whither of clouds, the stuff of which they are made, their formations and transformations, or the classification and names by which the wise know and speak of them—I propose to say nothing. My purpose is to deal with appearances, and to awaken in the reader a practical appreciation of the pictorial value of the sky in his picture-making with the camera.

**What a
"Sky" Means** In days now long past, when THE PHOTO-MINIATURE No. 24: Photographing Clouds, was published, the technique

involved in the proper treatment of the sky in pictorial photography was somewhat difficult and laborious. But today it is a comparatively simple matter, so simple, in fact, that there is no longer any excuse for the outdoor picture without a sky of some sort. These last few words may well introduce a warning which the gentle reader is besought to write upon the tablets of his heart, here in the very beginning of this adventure. A sky in the picture does not mean an elaborate arrangement of striking or impressive cloud forms atop of the landscape. This error has grievously misled many in the past, and is responsible for all the beclouded atrocities seen in the pictorial work of the past and present. You can have a perfect sky without a cloud, and in many outdoor pictures, just as in nature, a delicately graduated tint, growing very slightly more luminous as it reaches from the zenith to the horizon, will blend more harmoniously with the scene than the most laboriously "worked-in" cloud forms or pictorial sky. Beware of the "pictorial sky." If it is really pictorial and you get it in your picture, it will generally divest the scene of every other interest by its assertiveness. See to it that your every picture has its sky, if any portion of the sky is included in the scene. Realize that no picture of outdoors is true or complete so long as the sky space is simply blank, white paper. But make sure that the sky in the print is appropriate to the scene.

Appropriateness of Time and Place Provided that the reader will use his imagination, and give due regard to the spirit of place in his choice of the time and season for his picture-making, the sky in the scene at the time of photographing will very often, but not always, be found to be altogether satisfactory—if it can be secured in the print. For example: no one with any sense of the fitness of things would dream of photographing a deserted quarry, a stretch of moorland, or the long reach of beach at low tide under the pitiless glare of a summer day at noon. The spirit of such a scene is naturally expressed more appropriately in the early morning or late afternoon. And it is surely tedious and roundabout practice to take such a scene at noon, just because one happens to be there at that time, and, later, to attempt to work in a morning or evening sky, photographed under widely different conditions, just to get a pictorial sky in the picture. So that, if this little book about cloudland and sky does nothing more than give the reader pause, and persuade him to give heed to this spirit of place in his picture-making, it will, in part at least, accomplish its purpose of helping him to improve his work.

The First Lesson

At first, then, the reader will do well to confine himself to securing the natural skies found in the scenes he photographs. When this has been mastered and made easy by practice, and he has learned the first lesson, that harmony and fitness must bind together sky and scene, he will be better able to follow the painter, and, guided by a quickened and cultivated imagination, introduce into his pictures skies which perhaps interpret the spirit of the scene to better advantage than those present at the time of photographing.

Harmony

As to this important point, I recall a note by Horace Mummery worth quoting. He says: "There is one quality ever present to the trained eye, but seen to perfection only on certain days, which is, I think, the most exhilarating in Nature and the most satisfying when attained by Art. It is *the complete harmony between earth and sky*. The most casual observer will have

noticed that a sheet of water is affected by the sky above it, but it requires much careful study to perceive that the earth is sensitive to the great dome of light which bends above it. Above and around is light, the sun's rays do not fall merely like lamplight on the pavement, but are diffused through all the air, whether they gleam on white clouds or permeate the thinner vapors of the cloudless sky; whether the sun be present to sight or hidden away—everywhere is light reflected even into the shadows. This is the characteristic of the open air—the sky is above us. The earth lies soaked with the top light (how the roads and bare spaces gleam even on gray days and at night), streaks and mottlings of shadow fall across it, and gleams from the large, white-sailed cloud ships. The sky is not only above, but in front of all we see; the distances are bathed in air—the sky dominates all and sweeps the landscape into one harmonious whole.” Whether we get the scene and the sky together in one negative, or secure them in the picture by separate printings from different negatives, “their fitness for one another is the chief point to be remembered. . . . you want [to suggest that the scene had *that sky* above it.” There is good sense in this. It emphasizes the need for study and observation; shows how an appreciation of the natural unity of scene and sky makes for truer and better pictures; and points to the advantage of getting the sky in the scene into the print at one operation. Where this is not practical or convenient, or where the reader thinks that he can obtain more desirable effects by the introduction of another and different sky into the print from the scene negative, then he must have recourse to building up the picture by combination printing.

**Diverse
Methods**

There are many different ways of obtaining a sky in the picture, but they may all be roughly grouped in two classes: First, those methods which give the scene and sky in one negative (or combination negative) so that a single exposure or printing yields the finished picture. Second, those methods which call for the making and use of separate negatives of scene and sky, the two being combined in the print by separate exposures or

printings. In these latter methods, the sky negative used may or may not have been made at the same time and place as the negative of the scene. Generally, indeed, it is chosen from a collection of many cloud or sky negatives, made at different seasons and localities, for the very purpose of being combined with an outdoor scene where its use may seem desirable or appropriate in the worker's concept of the picture.

A Significant Change Until within the last few years, the latter methods were those generally employed. I cannot too strongly urge upon the reader the view that they were devised and used largely of necessity, because of the difficulty, until recently, of securing sky and scene together in one negative. It is true that their use was advocated, and is still urged, in the mistaken belief that a sky distinctly pictorial in itself is necessary, or desirable, as adding pictorial effect or interest to the composition. Today conditions and beliefs are changed, and the reader should mark the significance of the change.

Improvements Today we have not only backed or non-halation color-sensitive plates and adjusted filters, but also non-halation and color-sensitive roll and flat films, with color filters and sky screens extremely convenient and efficient in use. With these it is now a comparatively simple matter to secure the sky in the scene in the single plate or film at one exposure, and so completely remove the necessity for separate negatives and the tedium of combination printing. Very often this can be done with the hand camera held in the hand during exposure. Where a support is needed, one of the many substitutes for a tripod will serve the requirements of the moment. If it does not, the modern tripod has practically eliminated bulk and weight, so that it is no longer the cumbersome addition to one's equipment that it was years ago. So, too, the color-sensitive plates and films of today, and the color filters adjusted to their use, have been "speeded up" to a point which calls for increased exposures of only three to five times normal. With a sky screen, this increase of exposure amounts only to double the normal time.

The Sky Filter

The modern sky screen, otherwise known as a foreground screen or graduated light filter, deserves special mention as the mainstay of the amateur who wants skies in his pictures without any fuss or bother at all. It is simply a glass filter, the upper half of which has a graduated yellow tint, deepest at the top and fading into clear glass in the lower half. There are two forms: one circular, mounted in a cell fitting over the front of the lens. In this the tint is fixed, as to its area, covering half of the lens. The other form is rectangular, being fitted in a metal frame which attaches to the lens, so that the filter slides up or down at will, which permits of the variation of the graduated tint area to cover the varying depth of the sky space in the picture.

In Use

Used in its normal position, the graduated tint reduces the intensity of the light reflected by the sky, while the light from the landscape passes unobstructed, so that in effect the widely different intensities of light in the scene and sky are balanced to accord, in some measure at least, with the unequal capacity of the plate or film. The result is a negative in which both scene and sky have received proportionate exposure, appearing in the print as seen by the eye.

Exposure

As the action of such a filter is confined to depressing the light intensity of the sky, which is said to have at least four times the intensity of an open landscape, it would seem that the use of the filter should not increase the normal exposure required by any given scene. In practice, however, it is advisable to double the normal exposure. This ensures a full exposure for the un-screened landscape, and gives, with normal (tank) development, a thin, detailful negative in which the sky and the scene have approximately correct values.

How to Double It

The doubling of the exposure recommended does not preclude the use of a sky screen with a hand camera held in the hand for the majority of hand camera subjects. This doubling may be done in two ways: First, by halving the shutter speed without changing the diaphragm

or lens aperture, *e. g.* giving an exposure of $\frac{1}{16}$ second instead of $\frac{1}{25}$ second with the same stop; or, second, by doubling the area of the stop without changing the shutter speed, *e. g.* using stop $f/11$ (No. 8) in place of $f/16$ (No. 16) with the same shutter speed. It is commonly said that $\frac{1}{25}$ second is as long as the average amateur can hold the camera still in the hand, without movement. If such is the case with the reader, he must use the second of the two methods given above for hand exposures, or the tripod will enable him to use the first or both. But many amateurs, with a little camera drill, have secured the ability to make hand exposures of $\frac{1}{15}$, $\frac{1}{10}$, and even $\frac{1}{8}$ second without movement.

**Used as
a Foreground
Screen**

It is obvious that the sky screen has a double usefulness. Suppose we have a scene in which the sky at the time is not desirable, and we plan to print in a sky to our liking in the making of the print or enlargement. A simple reversal of the screen on the lens, so that it acts as a foreground filter, will give us a carefully controlled foreground and middle distance in the scene, with a density in the sky portion of the negative which will lend itself admirably to combination printing from a separate sky negative. Here, of course, the screen acts as a color filter, and the exposure should be increased from five to ten times normal, according to the amount of color in the scene. This will call for a tripod undoubtedly. It may be that, in such a case, a suitable sky may present itself before we leave the scene, in which event reverse the screen to its normal position, give the normal exposure only, and you will secure a good sky negative with the same horizon line as the scene negative, an obvious advantage when you come to the combining of the two negatives in the print.

**A Lens
Hood**

Before leaving this part of our discussion, I would urge the reader to purchase and use a sky shade or lens hood for all his outdoor work where the sky is to be included in the scene. This will effect an extraordinary improvement in the clearness and brilliancy of your negatives, and is especially desirable when photographing against the light or in strong diffused light.

**Plates
or Films**

The question—shall I use plates or films in outdoor work where the sky is to play its proper part in the scene? is easily answered today. If you prefer or are accustomed to plates, there is no need to change; but your plates must be backed and color-sensitive, and your color filter must be adjusted to the plate in use—according to theory. In practice I have secured scene and sky with unbacked self-screened color plates (Imperial) and a Bausch & Lomb Ray Filter (bichromate solution 1-200) which equal any I have obtained by a more careful following of theory. Further, I have latterly used these self-screen color plates and the sky screen with very satisfactory results, doubling the normal exposure as advised above.

Films

But today's suggestion is to use color-sensitive films and either color filters or sky screens for this class of work. The old-time preference for plates was based upon their higher color-sensitiveness, as compared with the roll films then obtainable. Now all rollfilms and filmpacks are sufficiently color-sensitive for all outdoor work, whether commercial or pictorial. And within the past year a flat film—Eastman's Commercial Ortho Film—has been introduced, which is equally suitable where larger sizes from 5 x 7 to 12 x 20 inches are employed.

For scientific work, where the purpose is to record cloud forms and meteorological phenomena of the most diverse character, the requirements call for panchromatic or red-sensitive plates and specially adjusted screens, which will give all that the eye can see, even to the most delicate wisp of fog. But with this sort of work we are not here concerned.

**Their
Advantages**

The advantages of our modern films are many. They have about one-tenth the weight of glass plates and occupy less than one-quarter the amount of space, whether in transportation or storage. They do away with the difficulty of halation under all ordinary conditions, and the difference between the base or support of the film and the glass plate gives the film a capacity for rendering the delicate light and shade gradations of a sky be-

yond that possessed by an emulsion on a glass support. This, added to the non-halation quality of film, makes it especially suited to the photographing of clouds and skies. The flexibility of films is another advantage, and they can be printed from either side, which obviates the final transfer necessary in carbon printing from glass negatives, and is useful in other ways. Finally, retouching, "doping," or any local modification desired in preparing the negative for printing or enlarging, may be done on both sides of the film, and with greater facility and freedom than with the glass plate.

Summing up these Preliminaries With these preliminaries disposed of, we may now profitably take up the different methods of getting a sky in the picture. We will assume that the reader has provided himself with films or plates that are color-sensitive and proof against halation, a color filter suited to the plate or film in use, a sky screen such as has been described, and some form of tripod or support for the camera when this is necessary by reason of an increase in exposure. The provision and use of these accessories should not be thought of as a burden or hardship attaching especially to the getting of skies in one's pictures. As a matter of fact the use of a tripod is really the beginning of wisdom, and certainly means a larger percentage of better pictures than hand camera work pure and simple. Similarly, the use of a lens hood and color filter or sky screen, all of which may be carried in the pocket without inconvenience, is a decided step toward the improvement of the technical quality of one's work. So true is this that the reader who will once accustom himself to their intelligent use will never thereafter be content to work without them.

The Simplest Method The first and simplest way of getting the sky in the picture in one negative, is to use any rollfilm, or the new Eastman Portrait or Commercial Ortho flat film, or any one of the self-screen (non-filter or anti-filter) color-sensitive plates, or a rapid iso or ortho plate properly backed, with a sky screen, giving an exposure twice that required for the landscape. This increase of exposure will not always mean the use of a tripod, as we have seen in discussing

the sky screen. If the light conditions are such as call for a normal exposure (without sky screen) of $1/25$ th second with stop $f/16$ (No. 16) the same exposure may be given with the sky screen by opening the stop to $f/11$ (No. 8). It may be remarked here that the use of stop $f/11$ (No. 8) is generally preferable to stop $f/16$ for most outdoor work, as avoiding the wiry definition apt to result from the use of the smaller stop. Of course, where after-enlargement is in view, then the use of $f/16$ (No. 16) may be desirable. In such an event, if the reader does not feel competent to give an exposure as long as $1/10$ th second with the camera held in the hand, then a tripod will be necessary.

**Where the
Tripod Helps**

One of the benefits resulting from the use of a tripod is that it enables one to give longer exposures with freedom from fear of movement. As under-exposure is the basic cause of nine-tenths of the failures seen in the amateur's work, the tripod eliminates these failures, giving altogether better negatives, with a longer and more harmonious scale of tone gradations.

**When to Use
a Color Filter**

Where there are pronounced color contrasts in the scene, as in photographing a formal garden in the early morning, with a desirable sky overhead which we want to keep in the print, a color filter should be used in place of the sky screen. Properly chosen, this will depress the over-intensity of the sky and, at the same time, give better color luminosity values in the foreground or scene. For such a subject, the combination of rollfilm or commercial ortho film and a Wratten K₁ or K₂ filter will give good results. The exposure will be increased from five to ten times normal with these filters, so that the use of a tripod will be necessary. For example, the exposure may be one-half or one second, according to the amount of color in the foreground and the filter used. Of course, a tripod should be used for such exposures.

**Full Exposure
Desirable**

By such means one's negatives will always be fully exposed, and development in any diluted, soft-working developer, such as is usual in tank development, will give soft, detailful negatives with agreeable contrasts,

and the sky in the scene will be represented in its proportionate intensity in the print.

Simplicity of Method As far as the amateur's everyday work is concerned, where the chief desire is to get the natural sky in the scene in the one negative, this is the whole story. Use a color-corrected, non-halation film or plate with a sky screen; use a tripod if an exposure longer than $\frac{1}{25}$ -th second is necessary, and make sure of a full exposure; and develop in a diluted, soft-working developer. If there are strong color contrasts, use a five or ten times color screen, adjusted to the color sensitiveness of the film or plate in use. A lens hood will add to the clearness and freedom from scattering light or veil in your negatives. There is nothing more to the problem than this in everyday outdoor work.

A Possible Difficulty Let us suppose that the sky in the scene is not just what we want. Here a little patience may be necessary. The sky is always changing. Wait a few minutes, or come back to the scene in an hour or two, and it may be that you will get a sky which fills your desire.

Or it may be that the day is cloudless, and you must take the scene then or not at all. This will perhaps indicate the printing in of a sky from a separate sky negative. In such a case, reverse the sky screen so that it will act as a foreground filter, use the tripod, and give a full exposure. This will give you the scene with a better rendering of values in foreground and middle distance than would the plain, unscreened film or plate. The unscreened, cloudless sky will, of course, be grossly over-exposed, and so will give a clear, white space in the print, which will permit of printing in of a suitable sky. In these circumstances make careful note at the time of the direction of the light, the general character of the illumination, the time of day and season, so that, when you choose the sky it may be one which is altogether harmonious with the scene. Or it is possible that you can revisit the scene at a future day, and secure the sky you want from the same point of view as that from which the original scene negative was made in the first instance.

**Local
Reduction**

In a case where a pictorially harmonious combination of clouds and foreground has been secured on one plate or film, but the sky portion of the negative has developed over much density, in spite of a judicious choice of plate or film and screen for exposure, the remedy is to locally reduce the density of the sky. This method, which simply calls for a little skill and dexterity in the use of a chemical reducer, is altogether preferable to any attempt to screen or dodge the sky portion of the negative in the making of the print.

For this purpose we may use either the ammonium persulphate or Farmer's reducer. If any later intensification with mercury is likely to be needed, then use the Farmer reducer, as the use of mercury after ammonium persulphate is apt to result in stains. Otherwise the ammonium persulphate is the better of the two reducers. The following formulas, given by Arthur Whiting, will be found convenient and reliable.

**Glycerinated
Ammonium
Persulphate**

Make up two solutions just before use.
A: Ammonium persulphate, 40 grains; water, 1 ounce; glycerine to make the solution up to 2 fluid ounces. *B:* Sodium sulphite, 2 drams; water, 2 ounces. We will need three large camel's hair brushes for manipulation.

In Use

All methods of chemical reduction (or intensification) presume that the negative has been thoroughly fixed and thoroughly washed. This is essential to the avoiding of stains or patches of uneven density following the process of reduction. The negative to be reduced is best taken while wet (after washing) and laid face up in a white porcelain tray. The film is made surface dry by the careful application of a piece of lintless blotter (Photo Finish World) and the tray inclined at an angle of about 30 degrees, with the sky portion of the negative at the lower end. Now, with brush No. 1, wet the sky portion with plain water, taking care to avoid wetting the foreground portion. Next, with brush No. 2, apply Solution *A* over the whole of the sky and repeat this until the density is slightly more reduced than is desired, as the film intensifies somewhat in dry-

ing. When this point is reached, charge brush No. 3 with Solution B, apply this to the sky portion as before for, say five minutes, and finally over the whole of the negative. Do not worry if a slight yellow stain is produced during the application of Solution A, as this will disappear after the use of Solution B. A final washing in water completes the operation.

Prepare the following Stock Solutions.

**Glycerinated
Farmer's
Reducer**

No. 1: Potassium ferricyanide, $\frac{1}{2}$ ounce; hot water, $1\frac{1}{4}$ ounces. Dissolve and add glycerine to make 5 fluid ounces. No. 2:

Sodium hyposulphite, 1 ounce; hot water, 2 ounces. Dissolve and add glycerine to make 10 fluid ounces. These solutions must not be used until cold. Where considerable reduction is needed, use 1 part of No. 1 mixed with 2 parts No. 2. For less vigorous reduction, use a mixture of 1 part of No. 1 with 9 parts of No. 2.

This reducer is used exactly as given

In Use

for the ammonium persulphate reducer above. It is more energetic in action

and gives an even reduction, whereas ammonium persulphate reduces the highlights or denser portions of the image more than the shadow details—which is preferable in reducing an over-dense sky.

Needless to say these methods are equally applicable in any sort of local reduction of negatives, so that familiarity in their use is worth acquiring.

**A Simpler
Method**

A modification suggested by H. D. Gower as the simplest way of getting clouds and landscape at one exposure is

to use a small stop and give the scene a minimum exposure for the foreground. Develop in a dilute solution of metol (without hydroquinone), or eikonogen or other soft working developer, thoroughly fix and wash. Now place a few ounces of a 1 per cent solution of ammonium persulphate in an inclined, deep porcelain tray. Lay the negative face upward on the upper portion of the tray, with the sky near the persulphate solution at the lower end of the tray. Apply the reducer to the sky with a broad camel's hair brush, taking care not to go past the horizon line of the view. When the sky is seen to be sufficiently reduced, immerse the negative

in a 10 per cent solution of sodium sulphite for five minutes and finally wash thoroughly.

This method is suitable for open landscapes or seascapes, without dark objects in the foreground.

**A Novel
Lens Screen**

A very curious method of securing clouds and landscape on one plate or film was suggested by Carey Lea and Thomas Sutton in the early sixties. I mention it here only because it has the endorsement of a skilled amateur of today as altogether practical in application. The method consists of an arrangement of small, narrow strips of gummed paper fixed to the lower half of the back lens in a sort of gridiron form. The strips must not be too broad or too many in number, four horizontal and one vertical pieces being sufficient. They should not reach quite all the way across and should cover just half the surface of the lens. The exact width of the strips is best determined by trial, their influence being easily seen in viewing an outdoor scene on the ground glass. The shadow they cast may be raised or lowered by means of the rising front of the camera. The definition of the clouds is not interfered with if the strips are of the right width and properly separated, the sky portion of the view being dulled because of the strips stopping part of the light reaching the plate from the sky. As large a stop or lens opening as possible must be used, as small stops tend to define the gridiron arrangement on the plate. Properly adjusted, the method is said to give delicately defined cloudforms of thin but printable density.

**Multiple
Exposure
Method**

Another curiously interesting method of obtaining acceptable combinations of sky and landscape on one plate or film was that described a few years ago by P. S. Greig, an English amateur, who illustrated his suggestion with half a dozen charming reproductions of the effects secured in the way described.

The object of the method is to obtain a sky in which several cloudforms were blended into each other to produce an interestingly varied sky-space, with broad effects of light and shade. It calls for full exposures and the use

of a tripod, with a shutter of the automatic variety now in general use on hand cameras.

The idea is to divide the necessary exposure for a scene into fractions and to give these fractional exposures at intervals. Suppose that we have a landscape calling for one-quarter second exposure, at $f/16$. Dividing this into, say, twelve parts, we get twelve exposures of $\frac{1}{48}$ -th second each. We set the shutter speed indicator at $\frac{1}{48}$ -th ($\frac{1}{60}$ -th) and press the bulb. So much for the first exposure. It is as well to have a piece of paper at hand to check off the fractional exposures as made. The aspect of the sky or cloud formation is, presumably, changing from moment to moment.

After any desired interval, say thirty seconds to a minute, we make a second exposure of $\frac{1}{48}$ -th second. Then we may wait until the cloudforms change to an especially effective massing of light and shade and make the third fractional exposure. This progressive series of exposures is thus continued until the whole of the total exposure, first determined upon as needed by the scene, has been given. Upon development we will obtain a combination sky giving a variety of diffused forms and light and shade effects.

The changes can be rung to any extent, *i. e.*, if a pleasing looking cloud, or a gleam of light, or other atmospheric effect comes along, two, four, or six $\frac{1}{48}$ -ths, *i. e.*, $\frac{1}{24}$ -th, $\frac{1}{12}$ -th, or $\frac{1}{8}$ -th, can be given at a time, in order to specially record that feature. The number of exposures we have taken above, *i. e.*, twelve, is, of course, quite arbitrary. Any number can be given—limited only by the patience of the operator—with any stop, provided only that the sum total of them all amounts to the correct exposure, *e. g.*, we might give three exposures of $f/16$ — $\frac{1}{24}$ -th, $f/32$ — $\frac{1}{2}$, $f/11$ — $\frac{1}{8}$ -th; or sixteen exposures of $\frac{1}{64}$ -th with $f/16$; or twenty-five exposures of $\frac{1}{160}$ -th with $f/16$, all of which amounts to $\frac{1}{4}$ -th second with $f/16$.

The interval between the exposures should not be too long if the face of the sky is changing very rapidly, or the distinction may show in the negatives. A few preliminary trials will soon give an idea as to the dura-

tion of these intervals. Needless to say, sunsets afford the most favorable opportunities for this class of work.

Graduated Skies

In large commercial work out-of-doors, it is not always possible or practicable to secure pleasing cloud effects, either in the negative at the time or by double printing afterward. Where this is the case, the barren emptiness of blank sky space can easily be overcome by the introduction of a graduated sky during the printing or enlarging.

Such a sky gives an evenly graduated tint, light at the horizon line and slightly darker at the top of the print. The following method is advised by Lambert for use in contact printing on bromide and gaslight papers. The slight modification required to adapt it for use in enlarging on these papers will be obvious. It is presumed that the original negative has a blank, dense, white-printing sky.

(1) Put the negative in a printing frame with a piece of white paper behind it and a piece of tissue paper on the face (glass side) of the negative. With a pencil trace the outline along the tree-tops where they come against the sky. This is commonly called the "sky-line." Divide the tissue paper (with scissors) along the sky-line. We now lay this on a piece of black or opaque, brown paper and cut a mask which, when laid on the face of the negative (glass side), just covers up all except the sky. Now cut away $\frac{1}{8}$ inch along this line, so the work shows all the sky and a narrow band of tree-tops along the sky-line. Our next stage is in the darkroom.

(2) Replace the negative by a piece of clear glass, put in contact with it a piece of bromide paper, and on the back thereof, along one edge, draw a pencil-line to mark the sky part of the picture—that is to be. Close the frame. Hold the frame in the left hand, with sky part uppermost, and with the thumb of that hand hold the black paper mask against the lower part of the print (outside) surface of the plain glass. Turn your back toward the light, so that the light falls over your shoulder evenly on the face of the frame. Take a piece of card, the same size as the outside of the printing frame,

in the right hand, and draw this card slowly down until you have uncovered and exposed to printing light the lowest part of the sky-line of the mask, and slowly slide up the card again. You should take about half a second to lower the card and another half to slide it up again to the top of the printing frame. In this way the upper part of sky gets most and the lower least exposure.

(3) Now replace the plain glass by the negative, being careful to put the printed, graduated sky part (marked by the line on the back) so that it comes over the sky part of the negative. As the sky part of the negative is too dense to print through, we need not trouble to mask this part, so that all that now remains is to give a second exposure, sufficient for the land part of the subject. The two exposures develop out together uniformly.

The beginner will, of course, go through the second process just mentioned with one or two small pieces of paper, and develop them out at once, so as to ascertain how many seconds' exposure, under plain glass, will give him the required degree of darkening.

It may be fancy, but I have the impression that one gets the better effect by exposing the sky part before, and not after, the landscape part.

Pigmented Skies Where the sky portion of the negative is weak in density and, normally, will give a disagreeably heavy, even tint in the print, similar in appearance to a dull, leaden sky, the introduction of a "pigmented sky" is often employed. As this method is also useful to the pictorialist who uses enlarged negatives and seeks to introduce bold cloud masses, vaguely defined, in his gum print, it may be worth while describing in detail. It calls for more skill than the "sunning down" method already given, but the skill comes with a little practice. It consists in working slight touches of oil pigment, such as crimson lake, into forms loosely suggestive of natural "cloud effects" in the sky portion of the negative. This hand work is done on the glass side of the plate, or, where films are employed, upon the separate sheet of glass which supports the film in the printing frame. In printing from the combined negatives, the pigmented side

of the cloud negative is placed outermost, in front of the negative proper.

The Method To produce such a sky, very small quantities of the pigment are applied to the glass at varying distances apart. The plate is now placed on a retouching or printing table so that it is comfortably held, illuminated from its under side, and these touches of pigment are successively worked or blended, with the ball of the forefinger, until the desired "cloud effects" or sky are produced.

It may be that this may seem to be a "horribly messy" process to the reader, but in the hands of a skilled worker it will quickly yield wonderful results, and is a ready means of locally improving the printing quality of any weak or defective negative.

Another Way A similar method is the working in of "cloud effects" with powdered black chalk or crayon on a sheet of ground-glass in place of pigment on clear glass, but this sort of negative will demand extra time in printing. Such negatives as are here described may also be produced quite readily by the use of an air brush, if the reader is skilled in the handling of this tool.

Second Group of Methods We now come to the second group of methods employed for getting a sky in the picture. In these methods, separate negatives of sky and scene are combined in the making of the print or enlargement. Obviously, such methods involve more skill and trouble than the simpler methods already discussed. But a knowledge of them is well worth while, since they offer the practical advantage of complete control of the sky in the picture.

Advantages Thus, where we have a landscape, river scene, or seascape in which an evenly tinted or graduated sky does not give an agreeable composition, or leaves the scene somewhat bare and uninteresting, the printing in of a suitable sky will remedy the defect or enhance the interest of the picture.

Or it may be that the reader, conscious of the pictorial urge, thinks that a sky other than that present when the scene was photographed would be more ex-

pressive of the spirit of the scene. Again, the reader may have in mind a sky which will give him a more pleasing arrangement or composition than is possible when the scene is photographed, or which will inject into the scene a sentiment lacking at the time of photographing.

The first step in adopting these methods is to accumulate a goodly store of sky negatives—a full hundred will hardly be too many. These are often spoken of as cloud negatives, and those who write about them have much to say of cloud forms and of times and seasons. But I would urge the reader to avoid over-indulgence in “cloud forms” *per se*, and to strive to get good skies, as offering fewer difficulties and larger satisfaction in use. The difference between the two is not easily put into words, but may be seen by comparing Cembrano’s “Sunset—Winter” and Hinton’s landscape among the illustrations in this issue.

Once the notion of seeking decorative or elaborate cloud forms is put aside, the making of a collection of sky negatives should prove to be an altogether delightful pastime. There are skies every day and everywhere, without any limit as to locality or season. All one needs is to have a camera, loaded with films or plates, ready for use at all times. The plates, of course, should be color-sensitive and backed or proof against halation, although an ordinary plate, unbacked, will give an excellent negative of a sky heavy with dark and light gray clouds only, without a trace of color. But films are best. A color filter, or two—one light yellow, such as Wratten’s K₁, and another of deeper color, such as K₂—will be needed, and a sky shade or hood on the lens, this last being a prime essential. For much sky work, the film hand camera equipped with a Kodak Color Filter, will meet all requirements. Where, by reason of the increase in exposure, due to the multiplying factor of the color filter used or the character of the sky, this will exceed $\frac{1}{25}$ th second, a tripod or support for the camera will mean better negatives. But here again a hand camera exposure will usually give us what we seek except on rare occasions. Where, however, we want a truthful render-

ing of the contrasts of luminosity in cloud forms, as in photographing cloud forms for their own sake and not for pictorial purposes, then a panchromatic plate and an adjusted screen, such as K₃, are called for. In my own practice, I find a 5-times screen lens at $f/16$, ortho film and exposures of $\frac{1}{16}$ -th to $\frac{1}{20}$ -th second, with slow development in diluted solutions, generally satisfactory and successful in result.

Sort of Negative Required A sky negative, to be used for printing in, should be much thinner in density than those to which we are accustomed in everyday work. Not that by this is intended a weak, flat negative lacking in sufficient contrast to give pleasing gradation in the print, but rather a soft, fully exposed negative, not carried too far in the development. There should, of course, be no clear film or glass in such a negative, and yet one should be able to see print through it when laid down on a newspaper. This for printing in on development and bromide papers; if it is intended to use platinotype, palladiotype, gum or carbon paper, then a more robust negative will be required according to the paper in use.

Suggestions It is sometimes advised that sky negatives should be made with a lens of much longer focus than that generally used in making the scene negatives, as giving a more pleasing perspective effect in the print. Another recommendation is to make the sky negatives on larger films or plates than are used for the scene negatives, so that the sky may be "juggled about" over the scene negative to secure a more pleasing composition. I have not found any real advantage in these variations, except where it is desired to introduce large and impressive cloud masses into a scene. It may be that I am somewhat prejudiced against over-bold and noisy skies, but I prefer the effects obtained with one and the same lens.

Sky-line and Horizon In making sky negatives for printing in or combining with scenes which will necessarily vary in character, a few points must be kept in mind. First, as to sky-line and horizon. Do not confuse the two; they are not identical. The horizon is the line which at sea forms the apparent

boundary of sea and sky, and on land would bound the sky were all obstructions above sea level removed. The sky-line is the line between the sky and any objects such as trees, hills, buildings, etc., which appear in the scene set against the sky as a background. It should be noted that the character of the sky and the cloud forms drifting across it differ according to their position above the horizon. Two rules follow this observation. Keep the camera level in making your sky negatives, *i. e.*, do not tilt it at an angle greater than 30 degrees, and always secure a strip of the horizon in your negative, so that the position or elevation of any clouds included may be seen at a glance. This will prevent you from making the blunder of printing zenith clouds into or near the horizon. These high altitude clouds will often appear to break the sky-line, where this is itself high above the horizon, as in mountain views or the sky-line of a city photographed from a low viewpoint; but if we were on the top of the mountain or high building and looked down the sky to the actual horizon, we would see that there is a vast amount of space, cloudless or with small cloud forms, between the big masses of zenith clouds and the horizon. This will be fully apparent when photographing in a flat country or at the seashore. Thus, on a day when the sky is filled with clouds, we can look down the sky, as it were, and see the cloud forms getting smaller and their forms less prominent as they near the horizon.

The exposure required will vary according to the general character of the sky, the time of day and season, and the plate or film and color screen in use. A few experiments will teach the reader more as to this than pages of text. With very brightly lighted clouds at midsummer, color-sensitive plates and a light yellow screen, lens at $f/16$, the exposure may be $\frac{1}{16}$ -th second; for normal conditions, from $\frac{1}{16}$ -th to $\frac{1}{25}$ -th second may be taken as a rough guide; while for sunset skies and heavy cloud masses, from $\frac{1}{2}$ to a full second may be required. Under-exposure is to be avoided as giving heavy, contrasty skies which are of little use except for scenes which portray stormy atmospheric conditions.

**Choosing
a Sky**

Having secured a fairly large assortment of sky negatives, the reader will doubtless be anxious to try his hand at printing a sky into one of his "bald-headed" or skyless landscape negatives. The first step, obviously, will be to choose a sky suitable for combination with the particular scene in hand for the experiment. In this choice of a sky several points are of importance. See that the sky and the landscape do not compete in interest. A suitable sky is one which blends harmoniously with the scene, so that it appears to the eye as the natural sky in the view and not as one printed in. If the scene itself is varied in interest, or has in it an object of prominent interest, it is well to choose a simple sky, *i. e.*, one without prominent cloud forms or strongly marked masses of light and shade. The skies in the examples by Demachy and Judge, among our illustrations, are good instances of such a choice. If, on the other hand, the scene includes a prominent object to which a definite sentiment attaches, to which it is desired to give emphasis in the picture, this can be done by the choice of a sky which, by its character will provide opposition of light and shade, as we see in the two illustrations by Whitehead, a worker noted for his discriminating choice of skies.

A clever example of the choice of a sky adding pictorial effect to a scene having little interest of itself, is seen in the reproduction of Arbuthnot's "The Hillside," which is, to my mind, one of the happiest combinations of earth, water, and sky imaginable.

**Faults
to Avoid**

This skill in the choice of a sky is something which comes by observation combined with endless experiment. It is a fascinating study and abundantly repays all the patience and labor called for. As a final word, I may mention a few of the commoner faults to be avoided. Study the composition of the sky proposed with that of the scene in which it is to be used. Remember that the sky must not be independent of, but part of the finished picture. Beware of repeating the sky-line or prominent lines in the scene by the leading lines of any masses in your sky. You can often secure the balance of your

composition by a choice of the lines or masses in your sky. See that the sentiment of the sky is in harmony with that of the scene. Especially note that the illumination of the sky and the direction of the lighting of cloud forms in the sky must harmonize with the illumination of the scene. Don't use a sharply focused sky negative and a soft focus landscape.

**Combination
Printing**

Many different methods are suggested for printing a sky into the picture where separate negatives are employed. They are all forms of combination printing, with modifications varying according to the printing paper used, and as to whether a contact print or an enlargement is being made. Here I propose to outline only the simplest methods, from which the reader may evolve his own procedure for his particular need.

**Preparing the
Negatives**

The first step in all the methods is to make sure that the landscape or scene negative has a sufficiently dense sky to give a clean, white sky-space in the print. If it already has such a sky, spot out all pinholes or dust spots with a finely-pointed brush and opaque color. If the sky is not as dense as is here required, it may either be blocked out with opaque water color or masked in the printing or exposure.

**Blocking Out
a Sky**

In the former practice two methods are suggested. First, go carefully over the sky-line with opaque water color and a fine brush (on the film side or face of the negative), being careful not to impinge on the sky-line itself, after which the rest of the sky-space may be solidly blocked out with strong color. This opaque screen can be removed at will by soaking the negative in water and then washing it in the usual way. The other, and perhaps better way, is to stretch a piece of slightly dampened onion-skin paper over the back of the negative, attaching it by a touch of strong gum at the edges. This will dry perfectly tight. Now, holding the negative up to a window or placing it on a retouching desk, carefully go over the sky-line and about one-eighth of an inch above it with a soft lead or crayon pencil, after which the rest of the sky is blocked out as before by

applying solid washes of opaque color (as dry as possible) over the paper covering this portion of the negative. Still another method is to cut a piece of matt, transparent celluloid to the size of the negative, and holding them together in contact at the window, carefully block out the sky-space on the celluloid mask, as advised for the preceding method, thus obtaining a separate sky mask without working on the original view negative.

Foreground Mask

We now proceed to make a foreground mask along the same general lines. This is best done by taking a second piece of celluloid, holding it in contact with the negative and opaqueing the whole of the foreground space, up to within a quarter of an inch of the sky-line in the view. This manipulation of the sky-line in both masks may present a little difficulty to the beginner, but facility and skill will quickly follow practice.

Printing Frame

For our combination printing we will need a printing frame one or two sizes larger than the view negative in use. This frame should be fitted with a piece of plain glass, over which we place a snugly-fitting piece of card, with an aperture which will just receive the view negative. This will hold the negative and masks securely in position during printing and materially help in securing perfect register or joining or blending of sky and landscape in the two printings.

Printing Methods

The method of printing will, of course, vary with the printing paper used. With print-out or platinum paper, it will be done in daylight, and we can watch the progress of printing as the image is visible. This makes it a very simple matter to get a good combination print, as any defects in the printing of the sky-line seen in the first printing can be remedied in making the second printing.

Development and Bromide Papers

Let us, however, make our prints on development paper, as that perhaps most likely to be used today. The method suggested will, of course, serve equally well for bromide printing, with the precaution necessary on account of the greater light sensitiveness

of the latter. The arrangements for printing are supposed to be made ready, and experimental exposures with the sky and landscape negatives have given us the relative exposures required with the paper in use.

**The First
Printing**

Working in a safe light, we first place the celluloid foreground screen or mask, already described, in the rectangular aperture of the cardboard in the printing frame. Over this we lay the sky negative selected for printing in, which will, of course, extend about a quarter of an inch lower than the actual sky-line in the scene negative before it is cut off by the opaque foreground mask. On this we now place the printing paper, seeing that it accurately fits the aperture along two sides for the purpose of registration. The frame is closed and the exposure made in the usual way, except that during the exposure we move a piece of cardboard (large enough to cover the printing frame) slowly but continuously over the sky negative, so as to shade or vignette the sky into a very slight tint where it will meet the sky-line in the finished print.

**Printing in
the Scene**

This done, the frame is opened in a safe light, the sky mask substituted for the foreground mask, the scene negative placed over it, and the paper carefully replaced in its former position in the cardboard aperture. To ensure this, it is advised to mark the top of the paper and one side to correspond with similar marks on the cardboard frame, which makes the correct adjustment of the paper for the second exposure easy. The frame is now closed and the second exposure, for the foreground this time, is made as usual.

The Result If the masking has been carefully done and the vignetting of the lower part of the sky into the foreground portion was skillfully handled, the development of the print should give us a pleasing combination of sky and scene, without any hint of the separate printings.

**The Copy
Negative**

When once the right combination print has been secured in this way, where the sky has been well chosen and the general effect is wholly pleasing, the tediousness of

this double printing can be avoided by making a good copy negative from the satisfactory print for afteruse in contact printing or enlarging. The best result is secured by first making a small copy negative, as suggested, and on this negative effecting any slight retouching or other improvement which may seem desirable. From this negative a transparency is made, in which further improvement or modification may be introduced if desired, and finally an enlarged negative in any desired size is made from the transparency, which offers still another chance for improvement. This is the plan often adopted by pictorialists in preparing their masterpieces for the exhibitions.

**Skies in
Enlarging** In printing a sky into an enlargement from a bald-headed landscape, the procedure is very slightly altered to meet the new conditions. We will suppose that a suitable sky negative has been chosen and the enlarging equipment adjusted ready for use. It is also taken for granted that the negative of the scene used has a sufficiently dense or blocked out sky. First carefully focus the scene negative on the enlarging board in the usual way and in the desired size. Place two darkroom pins exactly at the lower edge and one on the right-hand edge of the image. A piece of white cardboard is now held hard against the three pins, and the horizon or sky-line of the scene is drawn upon it with a bold pencil. This card is now carefully cut along the sky-line with a sharp knife or scissors, and the lower half marked with the word "landscape." Putting the yellow cap on the lens, the development or bromide paper is now pinned in position on the enlarging board, hard against the three pins mentioned. The exposure is now made, the yellow cap replaced on the lens, the pins removed, and the cloud negative focused. The foreground mask is now held over the bromide paper, with its lower edge and corners flush, so that it exactly covers the landscape. Two triangular pieces of black card are now pinned on the enlarging board so that they point exactly to the sky-line in the view (at each side) as indicated by the mask. The sensitive paper is now adjusted to about $\frac{1}{2}$ inch above the two black pointers and secured in this position.

The yellow cap is removed and the second exposure made (for the sky), during which exposure the cardboard foreground mask is gently moved up and down close to the paper, never going above the level of the pointers. Properly managed, this movement will give the effect of a vignette, blending the sky into the foreground in a completely successful way.

**A Simpler
Method**

A very much simpler plan, which I have only been able to try out roughly during the last few days, but which seems to promise satisfaction, is as follows: Make a careful transparency on Eastman Portrait Film by contact printing from the landscape negative with its dense or blocked out sky. Remove the exposed film, but before removing the landscape negative from the printing frame, adjust a rough cardboard mask over the front of the frame so that it will cover the foreground of the view to within a quarter of an inch of the sky-line. This done, remove the landscape and put in the sky negative. Put a second Portrait Film in contact with this negative, and make a careful transparency as before. During the exposure (which may be given by burning half an inch of magnesium ribbon at a distance of 15 inches), the sky is vignetted into the foreground (masked) by gently moving a piece of card up and down over the sky negative. If any trace of foreground appears in this sky transparency after development and fixing, it should be removed by local reduction with Farmer's reducer.

Foreground or scene and sky transparencies having thus been secured, bind them together and make a negative from the combination by contact printing. Such a negative may thereafter be used for contact printing or enlarging purposes, just as one uses a negative wherein sky and scene were secured at one exposure. It is not always that one gets a satisfactory combination negative by this method at the first attempt, but it is practicable and will give completely successful negatives if handled with due care in its different stages.

**In Carbon
Printing**

As those who have tried it know, the printing-in of a sky from a separate negative on a carbon print of a landscape or seascape is not the easiest thing in the world. First,

there is the difficulty of securing exact registration where it is attempted to combine the landscape and sky by two printings on the same tissue and get exact register, and then there is the difficulty of so gauging the exposure to secure just the right depth to give the desired effect in the finished print. If overprinted, the sky will be heavy and dominating in force; if under-printed, the delicate shadings of the cloud forms will be lost in development before the landscape is fully cleared.

**Combining
Two Prints** The following method, in which two prints from separate landscape and cloud negatives are combined by superimposition, is one which I can recommend as simple and sure in practice.

First make the landscape print in the usual way, develop it, harden and allow to dry thoroughly. Now fit the cloud negative in an adjustable or combination printing frame, place the landscape print behind it and mark the level of the horizon at that point of the cloud negative which is to be reproduced in the print. Remove the landscape print and adjust the masks so as to protect all but that portion of the tissue which is to be printed, vignetting the lower edge to prevent the appearance of a hard line in the combination print. Place a piece of carbon tissue in position on the cloud negative as adjusted and obtain a print which should be decidedly underexposed in normal practice.

**Developing
the Cloud Print** This second print, with the horizon line marked on the back of the tissue, is now squeegeed down into contact upon the landscape print. The lower part of the cloud print can be cut away before this is done. Development is now proceeded with in the usual way but only tepid water should be used as the lightly printed sky image may easily be washed away.

**Removing
the Overlap** Having thus secured a print of the sky upon the landscape, any portion of the sky print which overlaps the landscape may be removed, either by means of a camel's hair brush and tepid water (applied while the print lies immersed in tepid water), or by skilfully spraying the portions to be dissolved away with warm or hot water.

**The Use of
a Hot Spray**

The latter method is the more effective of the two. For this method we will need a tin can as a wash bottle, fitted with a blower spray tube such as charcoal workers use to fix their drawings. The mouthpiece of the blower spray may be fitted with rubber tubing to protect the lips from the hot tube during the spraying of the print.

In practice the wash bottle is filled with hot water and stood conveniently over a small spirit lamp such as dentists use. The print is held in the left hand supported on a zinc or ebonite slab, or laid down upon the slab in the development sink, and a stream of hot water is directed upon the overlapping portions of the sky print by means of the blower spray. The force of the spray may be varied by varying the distance between the nozzle of the spraying tube and the print, and the hot water thus applied in a broad, fine spray or a thin stream. The heat of the water used in this development will, of course, depend upon the correctness of the printing from the sky negative. If correctly (lightly) exposed, a fine, broad spray of fairly warm water may do the work; if overexposed, the water may have to be very hot.

The skillful use of the blower spray, as here suggested, has many useful possibilities in carbon printing, apart from its special application in this combination of prints from separate negatives. Its usefulness in the development of gum prints of the multiple-print variety will be obvious.

Photographs of War Activities

The following letter has been received from the War Department, Office of Chief of Staff, Washington, D. C. It is an invitation to all photographers—amateur and professional—to render service to the Government in furnishing material for the photographic history of the Great War, which is being compiled by the General Staff of the Army.

“GENTLEMEN:

“In the compilation of the pictorial history of the war, it is the desire of the War Plans Division of the General Staff to secure for the official files of the Army War College, a comprehensive series of photographs that illustrate the war activities of your city. Your coöperation is requested in the collection of such photographs as in your judgment should properly be included as a part of the permanent historical record of the part which your city has taken and is taking in this crisis.

“Among the photographs that may be included in this record are those that show the departure of local troops to the training camps or to the points of embarkation, the activities of the local war relief societies, including the Red Cross and the Food Administration, the arrests of enemy aliens and suspects, destruction of property attributable to enemy activities, sales campaigns for Government bonds and war stamps, visits of foreign officials, military equipment and methods of manufacture of equipment, the drilling of home defense organizations, draft scenes, enlisting scenes, entraining of troops and photographs of local commissions, boards and committees engaged in public service in connection with the war. In brief, this office desires any photographs, accompanied by brief descriptive captions, which show the war activities of your vicinity.

"Arrangements have already been made with the principal illustrative news syndicates of this country to purchase unmounted prints of this description at the nominal rate of seven cents each, which is the price at which official United States photographic prints are sold to them.

"This price covers merely the actual laboratory cost of production. This office appreciates that your co-operation in maintaining this photographic record can be based only upon patriotic grounds and that the monetary returns to you cannot be an object.

"Should any of these privately owned pictures be eventually published, they will be published with a proper credit line to the owner on the basis of two dollars each for publication rights, payable on an exchange basis for official United States photographs.

"You are in a position to render a useful public service in forwarding to this office for selection, such photographs as you have available, or that you may secure through the readers of your publication, that come within the scope outlined above, and in forwarding, at future intervals, such pictures that should be collected as a part of the permanent record of the war.

"Yours very truly,

"C. W. WEEKS,

"Lieut. Col. Gen. Staff,

"Chief H. B., W. P. D."

News Photographers Wanted for Service Abroad

The following communication is received from the Office of the Chief of Air Service, Washington, D. C., as this issue of THE PHOTO-MINIATURE closes for press.

The Signal Corps is in urgent need of expert news photographers. Men selected for this branch of the service must furnish satisfactory evidence as to their actual experience as staff photographers with some newspaper or news syndicate company, furnish three letters

of recommendation, and must be American citizens by birth. It is essential that they be thoroughly familiar with the use of a Graflex and other speed cameras, as well as various makes of lenses, their speeds, focal lengths, and the manipulation of various makes of view cameras in connection with ordinary photography and telephoto work.

General Pershing has made a request for the best available news photographers in this country to make photographs of important happenings in France. These pictures are to be preserved for future educational work in our schools and colleges and for a pictorial history of the war. It is intended to send the men selected overseas as soon as they have completed a short course in military training in this country. Upon the completion of this course they will be commissioned sergeants, first class.

Photographers who desire to see actual service in the near future should immediately communicate with the Air Service, Training Section, Photographic Branch, Washington, D. C., marking their communications, "For the attention of the Officer in Charge of Personnel."

It is requested that this matter be brought to the attention of all photographers and given the widest possible publicity.

Books and Prints

PHOTOGRAMS OF THE YEAR 1917-18. An Annual Review of the World's Pictorial Photographic Work: Edited by F. J. Mortimer, F.R.P.S. Profusely illustrated. Clothbound, \$2; stout paper covers, \$1.50. New York: Tennant and Ward. Obtainable from most dealers.

A heartier welcome than usual is due to this new volume of "Photograms of the Year," not only because its appearance marks the overcoming of tremendous difficulties, but also because of its remarkable interest and quality, as well as its splendid representation of the activities of American pictorial workers.

It is no small praise to say that this year's volume is fully equal to those of preceding years. I am strongly inclined to say the average of quality is higher this year. In range of subjects, in catholicity of pictorial methods, in the fine quality of the reproductions, both as engravings and examples of printing, as well as in the timely interest of the text, it fairly surpasses its own record.

No less than twenty-six of the eight-six examples of work reproduced are contributed by American pictorialists, California, Canada, New York, St. Louis, Buffalo, Philadelphia, Connecticut, Chicago, Hartford, Worcester, Pittsburgh and Wilkes-Barre being represented in this galaxy.

There are also examples of work from Holland, Japan, Egypt, Spain, Scotland, England, Sweden, Australia, Italy, India, and Persia. The frontispiece is one of Mortimer's strikingly fine marines; other notable plates are Keighley's "The Dayspring from on High" (scattering sun rays in a woodland scene of rare beauty); Porterfield's "The Hill Top;" Evans' "St. Bartholomew's;" a clever bit of portraiture by Essenhigh Corke; Weston's delightful portrait of Miss Dextra Baldwin; a decorative study of trees, by Cazeneaux; a characteristic portrait of the sculptor McMonnies, by Pirie MacDonald; and "A Vortograph" by Alvin Langdon Coburn, which, as has already been said by critics overseas, is quite indescribable, but nevertheless strangely interesting.

The text pages comprise a review of "The Year's Work," by the Editor; "Observations on Some Pictures of the Year," by W. R. Bland; "Photography's Part in the War," by Ward Muir; "Pictorial Photography After the War," by Antony Guest; Pictorial Photography in Australia, America, Scandinavia, Spain and Holland, by well-known pictorialists, in many of which references are made to the reproductions of pictures given elsewhere in the volume.

Altogether "Photograms of the Year" 1917-18 is a treasury of inspiration to those who are trying to make pictures, rather than photographs, with the camera, and offers much delectable food for thought to all who are interested in the progress of pictorial photography.

This brief notice of the book is given from an advance

copy just received. The American edition is somewhere on the Atlantic at this writing. If it eludes the Hun submarines operating on our eastern seaboard, our readers should be able to secure their copies from any dealer before the end of June.

ILLUSTRATED GUIDE AND DESCRIPTIONS OF PHOTOGRAPHIC INTER-LENS SHUTTERS; WITH DIRECTIONS FOR CLEANING AND REPAIRING. By William O. Hammer, San Francisco. 40 pages, 8½ x 11 in. Stout paper covers, \$2.50.

At first glance this booklet would seem to be absurdly high in price. But the very practical character of its information, not obtainable in any other work, completely disposes of this notion. It is apparently intended for dealers, watchmakers and others who specialize in the repairing and adjustment of exposure shutters, and to these, as well as amateurs possessing several shutters, it will undoubtedly prove a commonsense money-saver. This apart, Mr. Hammer has provided what has been wanted for years. He gives us interior and exterior views of seventeen of the most widely used inter-lens shutters, larger than "life" size, and with the different parts and movements numbered and described in specifications. With these and the four pages of instructions preceding the illustrations, anyone possessing a modicum of mechanical skill should be able to repair or adjust any of the shutters described, with little difficulty and complete success.

THE SCIENCE AND PRACTICE OF PHOTOGRAPHY. An Elementary Textbook on the Scientific Theory and a Laboratory Manual. By John R. Roebuck, Ph.D. 298 pp; with colored frontispiece and diagrams. Cloth, \$2.20, postfree. Tennant and Ward, New York.

With the exception of Derr's "Photography for the Student of Physics and Chemistry," published some years ago, this is the only work available which deals with the theory and practice of photography from the viewpoint of the student. It is, as the author explains

in his preface, a summary of his experience in giving a course of instruction in photography during the past seven years at the University of Wisconsin, and is divided into two parts, the first of which discusses the general theory of photographic processes, while the second part, as a laboratory manual, proposes twenty-four practical experiments for the student.

Despite minor errors here and there, and a few glaring examples of hurried proof-reading, Dr. Roebuck has provided in this substantial volume a very useful text, not only for the use of high schools and colleges, according to his primary intention, but also for the amateur and professional photographer who seeks to know the theoretical and scientific principles underlying the everyday processes of photography. Especially valuable are the chapters on "The Properties of the Gelatine Dry Plate," with its clear account of the labors of Hurter and Driffeld, Sheppard and Mees and Alfred Watkins; on "Color Sensitiveness," and "Latent Image Theories," as to which there is a widespread need of commonsense information. I commend the book as one which should be especially useful to the readers of **THE PHOTO-MINIATURE**.

Notes and Comment

It is with keen regret that I ask the readers and friends of THE PHOTO-MINIATURE to note an advance in the price of the magazine to 35 cents per copy, post-free; subscription \$3 per year—twelve numbers—post-free. These new prices go into effect May 15, 1918, and apply to all issues in print, old and new, as well as to all reprints and numbers hereafter to be published.

We have resisted the necessity of this increase in price as long as was possible; but the large increase in the cost of producing and distributing the magazine, under the prevailing conditions, has at last reached a figure which makes it quite impossible to continue at the price established in 1899, when we first began to publish THE PHOTO-MINIATURE.

The world-wide goodwill and appreciation with which THE PHOTO-MINIATURE has been received by photographers here and abroad since the first number appeared, give me confidence in the belief that it will still be found to be worth its price, even though the price is higher than it was aforesaid. The magazine and its work has always been, in my mind, a service rather than merely something made to sell at a price. In which belief I propose to persevere in the work with renewed vigor and unafraid as to its future.

A new variety of Palladiotype Paper, with a matt surface, has just been introduced by the Platinotype Company in England. It is said to give "lovely warm black tones with perfect gradation." Such a paper would undoubtedly find a wide welcome among our American portraitists and pictorialists, who loudly lament the passing of platinotype papers. The new palladio prints sent me by Willis & Clements, Philadelphia, since the above was written are extremely rich in color and fully sustain the description quoted.

MR. F. ERNEST CRAMER, of Saint Louis, writes that he has severed his connection with the Central Dry Plate Company, concerning which a note appeared in *THE PHOTO-MINIATURE* No. 167. I trust that this does not mean Mr. Cramer's permanent retirement from photography, wherein he has done yeoman service these many years and has made hosts of friends.

READERS who find themselves too busy to develop or print or enlarge from their summer exposures, and yet want these things done as carefully as they would do them for themselves, can find just the service they need at the shop of Miles Greenwood, Melrose, Mass. The quality of Mr. Greenwood's work is as remarkably high as his prices are moderate, and his service is unique in that criticisms and suggestions of great helpfulness accompany the negatives or prints he sends to his clients. I know of no service of this sort to compare with that offered by Mr. Greenwood to discriminating amateurs.

WHATMAN PAPERS. There is a growing tendency among serious workers in photography—amateur and professional—to prepare their own photographic papers and use carefully selected art papers for the mounting and finishing of their prints, as a means of giving individuality and distinction to their work. It is a praiseworthy movement, as getting away from the rut and commonplace of commercial things. To such workers I commend the well-known Whatman Papers as offering the qualities and distinctiveness they seek.

Whatman Papers have a reputation extending over a century of use by artists the world over; but they deserve a larger appreciation among photographers who aim at progress from the pictorial viewpoint.

James Whatman, the founder of the firm, studied the art of making paper by hand, away back in 1770, while traveling in Holland, in the suite of the British Ambassador. Returning to England he began to manufacture his hand-made papers, which in strength of

fiber, extreme purity, perfection of sizing, uniformity of thickness, and freedom from shrinkage or liability to mildew or discolor from age, are generally recognized as unequaled in this special field.

Such papers are peculiarly adapted for the preparation of Kallitype, platinum, and pigment printing papers, as well as for the final transfer in carbon printing and special effects in gum-bichromate. The heavier papers, rough-surfaced, such as Creswick, Etching, Rough, and Imperial and the Vellums are admirable for mounts and folders. The sample book, obtainable on request from H. Reeve Angel & Co., 7-11 Spruce Street, New York City, gives a complete showing of the Whatman line, and will delight the eye and taste of all who love fine papers.

EXPOSURE is still the critical point in picture-making with the camera. Which reminds me that G. L. Harvey has sent to my table a new (and the only) Exposure Meter for Motion Picture Cameras; a revised list of Plate and Film Speeds and an absorbingly interesting Pocket Book of Instructions and Information for the users of his No. 2 Meter for all Cameras as well as the M-P Meter. To catalogue the good points of the M-P Meter, or tell of the good things printed in the Pocket Book, would require more space than is available here. Suffice it to say, therefore, that the M-P Meter breaks new ground, and in the opinion of a friend who has an extended experience in motion-picture work, "just hits the spots in motion-picture making about which we have wanted practical information and could not get it." The No. 2 Meter is perhaps of greater interest to my readers. It is calculated for use with all Kodaks and Cameras, in any latitude, and for every plate and film in the market. The amateur who will read the Pocket Book and use this No. 2 Meter can hardly make a mistake in exposure. Think what that means in satisfaction and saving of waste!

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Retouching and Improving Negatives

We were sitting in a studio on Washington Square, on the confines of that Greenwich Village, which, for the moment, is the Bohemian quarter of New York. The other man was an amateur of note who has latterly devoted himself, more or less seriously, to professional portraiture of the pictorial sort—and threatens to make a success of the adventure. I had enjoyed half an hour's leisure in looking over a portfolio of his recent work, but at the back of my mind was this little book about retouching and improving the negative, and it suddenly came up into our chat together. "I know nothing whatever about retouching," said my friend. "What is it, and what should I really know about it?" But the time had come to seek the midday meal; we went out together to a nearby tavern and his question was forgotten. On my return to my desk the afternoon mail claimed attention. The first letter opened was from a photographer located in a small town in the upper part of New York state. It ran as follows: "What book have you telling how to finish the outside of portraits? It is a part of the business I have never tried to do. . . . I mean putting dope on their faces, so if they near broke the lens, so old, I can make them look forty years younger." In these two enquiries, from photographers working at opposite ends of the social scale, the reader has the key to the purpose and scope of this handbook, which aims to set

forth the why and how of retouching and improving negatives before printing, so that they will yield more pleasing prints.

**A New
View**

This is the third handbook on retouching negatives to be published in this Series, the two earlier monographs, published respectively in 1900 and 1913, being out of print and unobtainable. I trust, however, that the reader will not rashly prejudge what follows to be a mere rehash of what has already appeared in the earlier monographs. We change our notions and ideals with the changing years, and today's concept and practice of retouching and preparing the negative for printing differ widely from those of a few years ago. In this changed viewpoint, resulting from many different causes, there is abundant scope for a new and profitable treatment of the subject, and I am confident that even the expert in the after-treatment of the negative will find much of interest and downright usefulness in the following pages. To the reader who is in the same predicament as the two men mentioned in the opening paragraph, the book should prove to be all that the mariner prays for who finds himself sailing on an uncharted sea.

**A Better
Way**

In most of the published discussions of retouching, the writer begins with an allusion to the general condemnation of its practice. This is usually followed by a feeble attempt at justification and hints on how to do it. Other writers, under such headings as "The Vice of Retouching," wander wearily through an elaboration of that advice to those about to marry, which "Punch" summed up in the single word—"Don't." We have a better way in THE PHOTO-MINIATURE, which is to cut out all waste of words and go to the roots of the matter. Retouching, which broadly covers all after-treatment of the negative between fixing and printing, needs no justification. Either a negative, after fixing, washing, and drying, is so perfect in all its qualities that it will yield a wholly satisfactory print without further change or modification, and so needs no retouching or after-treatment, or it shows some imperfection

or need of change in order to make it give the best possible representation of the subject in the print. There is no intermediate state.

Is Retouching Unnecessary? That almost all negatives require some sort of after-treatment or preparation before printing is unquestionable. It is possible, in these days of perfected materials and advanced methods, to produce negatives of some subjects which, with a careful choice among printing papers and consummate skill in making the print, will give a thoroughly pleasing representation of the subject without retouching the negative. But in portraiture, at all events, it is rarely done except by such workers as my friend in Washington Square. These mix brains with their methods and employ a fine discrimination in their use of materials; by which means, coupled with pictorial lightings, the need for after-treatment of the negative is largely eliminated. Even in such cases, however, the result is often accepted by the victim on the basis that "It's not pretty, but it's Art." Let me be perfectly fair. I have seen such portraits which were not only "artistic" (hateful word), but also very pleasing as human documents, interpreting the subject with interest and charm. The lesson to be learned from this sort of work is that much of the retouching and after-treatment required by the majority of portrait negatives made in general practice might be avoided by the use of more skill in the treatment of the subject under the skylight, accompanied by a more intelligent choice of the materials and methods used in making negatives and prints. These last few lines are worth re-reading.

Just Extra Work Gathering from what has been written thus far, that the retouching or after-treatment of negatives may properly be regarded as so much extra work, made necessary quite as much by lack of skill on the photographer's part as by difficulties peculiar to the subject, it may be profitable to look into the practical possibilities of avoiding this extra work before we take up the various methods of retouching or after-treatment themselves. In other words, let us consider the retouching of negatives from

today's viewpoint, as an evil not always necessary; to be avoided or minimized as far as this may be possible in the individual case.

**The Purpose
of Retouching**

The commonly accepted conception of retouching methods is that they have two distinct ends or purposes. The first is to remedy any defects in the negative considered simply as a printing plate. The second is to change or modify this or that detail in the presentation of the subject, so as to obtain a more pleasing result in the print than could be had from the untouched negative.

**Its Legitimate
Field**

The trouble with our forefathers was that they confused these two purposes, at least to the extent of placing upon the retoucher the threefold burden of remedying the defects of the photographic process, the mistakes made under the skylight and in the darkroom, and the real or fancied shortcomings of the subject. Today we follow a more intelligent way. This is to coördinate the work of the operator under the skylight, the darkroom assistant, and the printer with that of the retoucher, so that each is made to bear his own proper share of the burden. In practical result this leaves the retoucher to his own legitimate field, which is to make such changes in the photographic record of the subject as are necessary or desirable to make the negative yield a print which will please or satisfy the patron, as the person most intimately concerned.

**Early
Conditions**

First, then, as to the studio and darkroom work in portraiture. In the old days, when retouching was first introduced, photographers used the wet collodion plate, which was wholly lacking in color sensitiveness as we understand the term today. This plate, being color-blind, failed to give either a truthful or favorable record of the differences of color in the subject. The range of printing papers then available was very limited, calling for negatives having from three to five times the printing density of the average negative of today. And the professional studios of those times were constructed to give a more intense illumination immediately above and around the subject than that now employed. This

was necessary because the wet collodion plate was slow, compared with the dry gelatine plate of today, so much so that the tendency was toward under-exposed negatives, possessing more pluck or brilliancy than is now considered necessary or desirable.

Old-style Negatives The net result of these conditions was a negative in which the lights and shadows making up the picture image, and the general modeling of the subject, were more strongly marked—more emphatic in character—than we seek for today. Today's negatives, in fact, are mere ghosts, compared with those of our fathers' day. Necessarily, any defects in the illumination of the subject, and the exaggeration of facial blemishes or minute differences of color unnoticed by the eye, together with the harshness of the light and shade contrasts arising from slight under-exposure, were very plainly evident in the negatives of those earlier days.

Old-style Retouching As one consequence of this, the retouching (removal or softening down) of such defects in this sort of negative had to be positive, if not drastic, in its character. It was on this unpromising basis that the art of retouching came into general use. Broadly speaking, it consisted in covering the features, neck, bust, and arms in a portrait negative with light touches of color or lead—filling in the patches of uneven density, softening the too-heavy lines and shadows, and building up or modeling the face—until the skin of the subject, wherever visible, presented the soft, even texture which it has or is desired to have in life. As the art developed, the "touches" were regulated so as to give the skin a more or less definite texture, and the modeling was standardized so as to conventionalize the features, conforming them, as far as possible, to certain generally recognized ideals of beauty.

Changed Conditions Today the conditions are changed, and our methods are changed, or must change with them. Even the public taste has changed, at least to the extent that it no longer demands that smoothness of finish or that conventionality in form as to the features which the old-

style retouching gave to the portrait. The bother is that photographers do not yet perceive these changes and cling to the old ideas and ancient ideals in retouching. This explains why so many photographers still think it necessary to put into their negatives the same amount of work, of the same drastic character, as was put into the negatives of a quarter of a century ago. It is true, as they protest, that the women of today are as insistent as their grandmothers were that their portraits shall do full justice to whatever beauty they think they possess, and that the men are as finicky as ever in the matter of personal pulchritude. But it is equally true that the men and women of today want character and fidelity of likeness, as well as a favorable interpretation of personality, in their portraits. And it is this which has brought about the new viewpoint of retouching. If this little book brings the reader to a realization of the new order and gives him a practical appreciation of the better methods of today, it should be worth many times its cost.

**Eliminating the
Need for
Retouching** The first step in this new order of things is to systematize methods and materials in the studio and darkroom, so that they will give negatives requiring a minimum of retouching and after-treatment, as far as their technical quality as printing plates is concerned. This may mean the abandonment of plain plates in favor of double-coated, panchromatic plates or the new portrait films; a rearrangement of your skylight and lighting procedure, so that your lightings of your subjects will be softer, more harmonious in tone-values and more fully exposed than in the past; and the adoption of new darkroom methods, such as the Core open-tank developing system, which will give you more complete control over the color and printing quality of your negatives than the old-style practice. But the changes will be well worth while if they reduce the volume of retouching or after-treatment needed by your daily negative output. This, not only on account of the saving of time and labor, but because the more you retouch or modify the negative by handwork between fixing and printing, so much the more do you risk

the losing of character and likeness in the portrait. And these are the vital elements in portraiture. Furthermore, the adoption of these modern methods in studio and darkroom work will certainly advance the average quality of your work. In proof of this, examine the work of half a dozen photographers, beginning with the four-for-a-dollar man and ending with the portraitist who asks ten dollars a print, and you will find the latter making negatives requiring little or no retouching of the remedial sort, while the four-for-a-dollar man's work is smoothed and retouched to excess.

**Soft-focus
Lenses**

In this rearrangement of methods, the proper use of a soft-focus lens and rough-surfaced printing papers, or the use of a diffusing device in printing, should not be overlooked. I confess to some hesitation in suggesting the use of soft-focus lenses, because they undoubtedly need more intelligence and skill in use than the normal portrait lens, and in unskillful hands produce the worst possible results. Also, it must not be forgotten that no amount of diffusion of definition will do away with the necessity for retouching in the case of a freckled face or strongly marked facial blemishes. The elimination of retouching here depends on the lighting of the subject and the use of a color-sensitive plate, not upon the lens.

**Printing
Papers**

As to printing methods or papers, the prevailing tendency to use only smooth or surfaced papers in portraiture is not wholly reasonable. Wherever the size of the head exceeds two inches in width, a rough paper will give more roundness, relief, and character to the subject than can be obtained by the use of a smooth paper, and so will add to the pictorial character of the portrait, apart from doing away with a lot of work in the preparation of the negative for printing. There is far too much fine finish and smoothness about the large heads now so popular. This means time and labor spent on the negative, to the loss of likeness and other desirable qualities. If the reader is at all skeptical on this point, let him take a softly lighted negative of a large head, either of a business man or a fashionable woman, limit his retouching to ten minutes' work in softening

the lines and marks of age in the subject, and make a straight gum print in warm black, a slightly diffused print on a rough-surfaced bromide paper, and a third print on the regulation smooth gaslight paper. This will prove a convincing test of the vital influence of the printing method or paper as far as the avoiding of retouching is concerned.

**Diffusion
in Printing**

For those who are prejudiced against the use of soft-focus lenses, I recommend a course of experiment in the use of a diffusion device in printing, as a means of reducing the amount of retouching usually given to portrait negatives. It is remarkable what can be done with such a device properly handled. Where the large portrait is made by enlargement from a small negative (a method which is growing in favor), this diffusion can be effected by the use of bolting silk. Where a large negative is printed from directly, either in the individual printing frame or printing machine, the diffusion effect is best secured by splitting the exposure, the first portion being made with the negative in contact with the paper, and the second half with a piece of celluloid between negative and paper. In this method some means of registering the two printings must be employed; the degree of diffusion being regulated by the use of celluloid of different thicknesses and the variation of the printing-time with and without the diffusing screen. A simple and ingenious registering and diffusing device for this sort of work has been invented by a prominent New York photographer, Mr. Charles H. Davis. It is used in connection with an electric printing machine, but I do not think it is as yet commercially obtainable.

**The Color of
the Negative**

Of the importance of regulating the color and printing quality of the negative to the kind of printing paper used, as a means of minimizing the amount of retouching or after-treatment required by a negative, it should not be necessary to speak. Unfortunately, however, many professionals, and most amateurs, seem to overlook this detail in practice. A simple test will give the necessary proof in this matter. Make two negatives of the same subject from the same viewpoint. Give

one the normal exposure and the other a full, or very slight over-exposure, without, however, pushing this to flatness of illumination. Develop the first in the normal developer and by the method habitually used for such work. For the second exposure use a developer in which the proportions of carbonate and sulphite are so adjusted as to give a soft, greyish negative, with just a suggestion of greenish tinge, so that there will be a little color even in the deepest shadows. When these negatives reach the retouching desk it will be found that the second negative will need less than half the amount of work required by the first, and the print from the second will be altogether better than that given by the first. So true is this that a well-known dry-plate demonstrator, when summoned to aid a photographer complaining of the amount of retouching and after-work demanded by this or that plate, invariably begins his campaign of education by insisting on full exposures and the adjustment of the developer in the way I have suggested. As he said: "It makes all the difference in the world as far as the print is concerned."

Chemical Retouching

So much having been said about the modern methods of avoiding or eliminating the necessity for much of the work formerly put upon the retoucher, we can now take up the various ways of chemically retouching or improving negatives before printing. These methods, comprising reduction, intensification, and clearing processes, are strictly darkroom methods, and are logically included here because they must be employed, if at all needed, after fixing and washing, and before the negative comes to the retouching desk. They have for their object the improvement of the negative as a printing plate and the reducing of the amount of retouching with pencil and color which would otherwise be necessary.

The vital fact about all methods of chemical after-treatment of negatives is the necessity for complete fixation and thorough washing before attempting either intensification or reduction. The avoidance of stains, the printing quality and the permanency of the negative depend upon this, hence its importance.

Nota Bene

First as to intensification. Let us suppose the negative to have sufficient detail, but to be thin in printing density and somewhat "soft" or "flat." Such a negative means that the retoucher will have to pile on lead and color until he has so built up the lights as to give the necessary vigor and modeling. This strengthening of the lights can be more effectively accomplished, and without the risk of losing the likeness, by the use of the single-solution mercuric iodide intensifier suggested by Lumière. Make a solution of 4 ounces of sodium sulphite in 20 ounces of water, and when thorough solution has been obtained, add 90 grains of red mercuric iodide. This solution keeps well in the dark or in a stoneware bottle, and may be used repeatedly. It is better to work in very subdued daylight or artificial light, as daylight tends to produce veil in the negative during intensification. The use of a white porcelain tray is also advisable, as making it easier to watch the progress of intensification. In this intensifier the negative builds up in density in the highlights within five to ten minutes, becoming brownish in color. When the desired degree of intensification has been secured, wash the plate under the tap for a few minutes, and then immerse it in any non-staining developer, such as metol-hydro or glycine. This will restore the original color of the negative without adding to its density.

If the negative is hopelessly thin and weak in detail, the following mercury intensifier will be found useful as permitting of local improvement where general increase in density is not desired. Prepare the following solution: Dissolve 30 grains potassium bromide in 10 ounces of distilled water; add 2 drams mercuric perchloride and, when this has dissolved, add 10 minims of hydrochloric acid. This mixture should be filtered and can be used repeatedly if kept away from the light. Work in subdued daylight or artificial light. First determine whether you want to increase the density of the shadow detail only, or to increase the general density slightly, or to obtain a decided increase of the contrasts throughout the entire negative. Then,

for the first effect, pour the solution over the negative and stop its action immediately the surface of the film begins to whiten by washing under the tap. For the second effect, let the whitening of the film continue until the half-tones are seen to be bleached at the back of the plate or film, with the highlights still black. For the third effect, continue the bleaching right through the film. Rock the tray during the whole of the bleaching process, wash well under the tap when this has been sufficiently accomplished for the purpose in view, and then lightly pass a wad of absorbent cotton over the film once or twice to remove any insoluble mercury compound on its surface. The negative is now blackened or restored to its original color by immersing it in a 10 per cent solution of sodium sulphite until the color is clear and uniform, after which wash well and dry.

Reduction: For negatives which are too thick
Farmer's or heavy in density, we need to employ
Solution the process of reduction. Here, again,
we first determine whether we want a

general reduction of the density or simply a slight reduction of the density of the lights in the negative. For the first we can use the well-known Farmer's reducer, made up as follows: Dissolve 2 or 3 ounces of clean hypo crystals in 20 ounces of water. To this, when thorough solution has been obtained, add a few drops of a 20 per cent solution of potassium ferricyanide. "A few drops" may not seem to be a very definite way of telling how to make up a working solution, but the fact is that the reducing action of the reducer depends upon the quantity of ferricyanide added, so that one adds just as much as may be needed to give the amount of reduction desired. A few trials with solutions of varying strength and a waste negative will enable the reader to judge the needs of a particular negative on occasion. It should be noted that the characteristic action of this reducer is to do proportionately more work in the shadows than in the highlights of the negative, so that its use results in a strengthening of the contrasts in the negative. This action is more plainly evident in the use of a strong solution than with a solution in which less ferricyanide has been added.

With Persulphate If, on the other hand, we desire to reduce the negative generally, but with a proportionately greater reduction of the highlights than of the shadow detail, then the ammonium persulphate reducer should be used. This is made at the time of use by dissolving from 40 to 80 grains of ammonium persulphate in 4 ounces of water and adding 4 drops of sulphuric acid. The negative to be reduced is first soaked in water until the film is well softened; then the reducing solution is poured over the plate or film, the tray being rocked constantly. Watch the action of the solution closely, and immediately the desired reduction has been reached (or preferably just before it reaches this point), remove the plate from the reducer and immerse it in a tray, placed alongside, containing a solution of 1 ounce of sodium sulphite dissolved in 20 ounces of water. This reducer calls for negatives which have been very thoroughly fixed and washed, otherwise it is apt to be uncertain in action and to give stains.

By Re-development Another good reduction method, which is more easily controlled, is to bleach the negative completely by immersing it for five minutes in a solution made up of: Water, 20 ounces; potassium ferricyanide, 300 grains; and ammonium bromide, 100 grains. This acts on the whole of the image, leaving it a pale buff color. Now wash the negative in running water for fifteen minutes and redevelop it to the density desired in a soft-working, slow developer, such as Rodinal, Paranol or Azol, 1 dram; water, 6 ounces.

Physical Reduction For the local reduction of density in small portions or details of negatives, the most successful results are obtained with the abrasive pencil or an etching knife. These are dangerous tools in the hands of the unexpert, but will do wonderful work when handled by one who understands just what he wants and has learned by practice how to get it. Their proper use can hardly be learned from a book; one has to learn to see just what is needed in the individual case, and then, by persistent experiment, acquire the knack of using the particular tool in

hand so that the desired effect is secured. This ability comes quickly by intelligent practice.

Abrasive pencils are simply any sort of tool, shaped like a pencil and bluntly pointed, which can be applied to reduce the density of a small area by gentle and careful rubbing or friction. Thus a tortillon or small, bluntly pointed paper stump, charged with a thin mixture of alcohol and jewelers' emery powder, is well suited for the reduction of such comparatively large areas as the heavy masses of lighting in the hair of a portrait subject, or the folds of a dress, the too broad lighting of a linen collar, the bringing out of the detail in a woman's lace neckpiece, etc. For small details one may use a bluntly pointed matchstick, covering the point with any fine fabric and wetting it with alcohol alone. There are also available pencils made of an abrasive composition, perhaps gutta-percha with which some abrasive powder is incorporated, which are very useful for small and comparatively large areas, as they can be pointed to any desired size or bluntness. Another similar device is a pencil-holder, tipped with a glass brush, which is very effective when skillfully handled. I have found this especially useful for the general reduction of scattering highlights in the details of a costume, the feathers in a hat, etc.

Etching Knives

Etching knives are obtainable in endless variety. Half a dozen of these are illustrated herewith. Those who are expert in their use are unanimous in condemning all the commercial knives as utterly useless—which, of course, is nonsense. The fact is that every man who, by patient experiment and practice, arrives at proficiency in the use of this tool has very decided ideas about the sort of knife he requires for the work. Any knife, the blade of which is so shaped, set, and edged that it is capable of shaving away an infinitely fine or thin layer of density from the negative film, will do the work if you know how to handle it. The bother is that you cannot learn this handling from a book. Properly you should see it done, see the method of holding the knife, the stroke or action used in shaving the

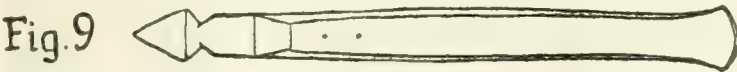
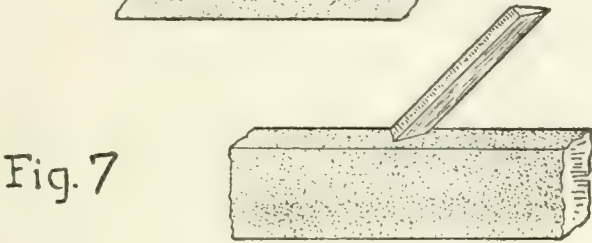
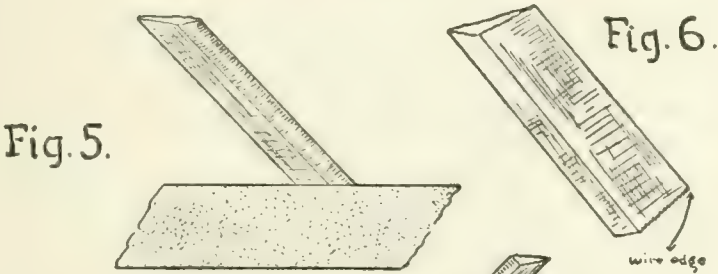
film, and the effect of the stroke. What is required is to reduce the density of the film at any given point, or within any given area, by skillfully shaving off a thin layer of the film at that point, just as a carpenter shaves off the rough surface of a sawn board by pushing over it a steel plate, with a beveled, keenly sharp edge, set on an angle to the surface of the board in a tool called a plane. An etching knife is simply a blade of steel set in a handle of convenient shape, and having a sharply beveled cutting edge, so fine and sharp in its edge that, when passed with gentle pressure over any given area of a negative film, it will shave off a minutely thin layer, thus reducing the thickness of the film within that area and so reducing its density or color. See Fig. 11, Plate II, a commercial etching outfit.

Making an Etching Knife One expert advises the making of such a knife as follows: Fix an ordinary sewing needle in a handle, and, after making the point red-hot, shape it with a fine, flat file, so that one side is made flat and the other beveled to it at an acute angle. The flat edge should be to the left and the angled edge to the right when the tool is held with the sharp edge to the negative film in use. After grinding this edge on a stone to a razor-like sharpness, harden it by making it hot (red-hot, not white-hot) in the fire or the flame of a spirit lamp and plunging it instantly into cold water. This knife is shown in Fig. 3, Plate II.

Other Varieties Another expert advises a chisel-shaped blade, as seen in Fig. 4, Plate II.

As to the edge and shape of this he says: "The tool must have plenty of strength and resistance and be stiff enough to avoid vibration, for which reason it is made chisel-shaped as seen in the illustration. To sharpen the tool, a fast-cutting stone of fine grain is necessary. The etcher should be placed flat on the stone, as shown in Fig. 5, Plate II, and ground down well. This operation, of course, turns the wire, or fine edge, over on the cutting edge, as shown in Fig. 6, Plate II, and this must be removed by a stroke on a piece of soft blotting paper to turn the wire edge back straight. We now find that we have a very rough edge,

PLATE II



and to remove this it is necessary to place the cutting edge itself on the stone as in Fig. 7, Plate II, and with very little pressure draw the edge across the stone for about half an inch; this will afford a perfectly smooth edge."

A third expert claims that the surgeon's small scalpel provides the best etching knife, as seen in Fig. 8, Plate II. But this sort of knife is better adapted for scraping than shaving the film, and it is now generally agreed that the shaving method is surer and less risky than the use of the scraper. If, however, one side is ground flat and the other acutely beveled toward the cutting edge, the scalpel will serve as a useful shaving instrument. There is also on the market a nib-shaped knife, as illustrated in Fig. 9, Plate II, which can be made into a very useful tool for shaving off and reshaping an over-wide waist-line, an angular elbow, the lights on the figure, and so on. The French have an etching point similar to this, made in the form of a pen-nib, but without the vertical slit of a pen, shown in Fig. 10, Plate II. This fits an ordinary penholder and is very convenient and efficient in use.

Essentials in Etching

In every sort of knifework on negatives the first essential is to be sure that the film is bone-dry. If the negative is likely to have absorbed even a little moisture from the air while waiting its turn for treatment, it is well to re-dry it with gentle heat before beginning with the knife. The second essential is to acquire such a manner of handling the tool so that it is always well under control and will do its work without scratching or rough cutting. This will come with patience and experience in the use of the knife.

The Method of Working

One expert tells us to remember that the gelatine film of the negative has a definite thickness, and that most of the deposit (or density) lies in the upper part of that thickness, so that only a thin shaving must be removed, and on no account must the cutting edge of the knife go through to the glass. To prevent this, the knife must be held very steadily and in a particular way. I quote his instructions verbatim: "The blade is held

between the fingers and thumb of the right hand, as near the point as possible, the knife being almost vertical and the back of the hand uppermost. The tips of the fingers and thumb rest on the surface of the negative, so that the hand can be quite steady, motion being imparted alike to the fingers and the knife from the wrist. The blade is brought down, at the right angle to the film, and pushed over the part to be pared down. The depth of the cut will be found to be quite controllable, but all the control must be one way. We must seek each time to take the thinnest possible shaving off the negative, no matter whether the total quantity to be removed be much or little. It must be gradually planed down, not scooped out. Power comes with practice, and it is easier than it looks."

Another expert advises: "Grasp the knife lightly in the hand, in the way one would hold a pencil. Let the cutting portion of the knife gently rest upon the part of the negative to be erased, with the back of the blade inclining about five degrees over towards the left hand of the worker. Now, according to the position of the work to be erased, the strokes of the knife will be gentle, 'soothing' touches from above to below, and from right diagonally to left. It is incorrect to work backward and forward with a perfectly set knife. Be sure to select the right portion of the blade most adapted for the work, and according to whether you wish to plane over a large, or shave over a small surface. Skill in knifework necessarily depends on practice, but the 'knack' comes quickly.

"The ideal etching knife should have at least two cutting positions of the blade, the one adapted for fine, and the other for broad erasures.

"The utmost care and skill is required to prevent cutting away too much of the density. Indeed it is difficult for the expert worker to knife lightly enough in the lighter parts, and considerable practice is necessary to make one's self expert in this particular. It is less easy, too, to fill in with lead parts which have been knifed, and the work is apt to show a kind of channeled or corrugated appearance when finished."

**How to
Learn**

In my own practice I acquired the right way of handling a knife, and the right sort of stroke needed for this or that effect, by persistent practice with waste negatives, of which the studio in which I learned my profession had aplenty. A better plan, and one especially adapted for the beginner who can't lay hands on waste portrait negatives on glass, is the method suggested by Mr. C. L. Venard at a recent photographic convention. I quote: "Take six pieces of oil tissue, the largest 5 x 6 inches, the next 5 x 5 inches, and so on down to the smallest 5 x 1 inch. Glue these sheets onto a sheet of 5 x 7 glass, attaching the sheets by the edges only.

"Place this tissued glass in a printing frame in contact with a 5 x 7 plate. Afford a very slight exposure and develop and fix the plate. You will find this plate to possess seven grades of density; this is simply a practice plate so it will be well to make several duplicates for further practice.

"Place this washed and dried practice plate in your retouching stand, and then take your etching tool and attempt to etch shade No. 1 until it is the same density as No. 2, then work on No. 3 until it is the same density as No. 4 and so on.

"Use a broad, even stroke, and practice over and over until you can etch evenly and smoothly."

**The Scope of
Knifework**

What can or should be done with the knife? This is a difficult question, the answer depending wholly upon the judgment, skill, and discretion of the individual worker. The purpose of knifework should be thoroughly understood. This is to reduce the density of the negative at any point, or in any area, where this is necessary or desirable as a means of improving the presentation of the subject in the print. It may mean the total removal of density or merely softening or modifying it, so that the detail treated will not be obtrusive in the print. Just as, in retouching with pencil or color we add density in this or that part of a negative, thus effecting a sort of local intensification, so knifework is a method of local reduction, having an effect exactly the opposite

of intensification. Of the two, local intensification with the pencil is the easier method and success with it calls for less skill and practice.

With the knife we can reduce any
Defects excessively dense lights which distract
Needing the eye in looking at the subject, such
Treatment as a row of buttons on a dress, undesirable lights on the lips or the tip of the nose, or broad patches of light on the hair. The details of a hat or costume which have caught the light and will attract undue attention in the print may likewise be softened or toned down by a few judicious strokes of the knife. Similarly, the over-emphatic lights on prominent cheekbones, an undesirably broad light along the flattened ridge of a wide or thick nose, the patches of density in the negative which in the print will reveal a double chin or sagging jaw, and the lighted ridges which show over-prominent muscular lines in the neck, an obtrusive collarbone in the portrait of a young girl, or Adam's apple in a man's portrait, can all be made less conspicuous by suitable knifework. In the same way an undesirably thick waist-line, an angular elbow, or a wrist or forearm which is thick and unshapely can be given a more pleasing form; which applies to any unshapeliness in any part of the face, figure, or costume. A face that is too round and plump, a mouth without the desirable little shadow at its terminations, thick and unshapely lips, a broad and flattened forehead can be improved by the skillful use of the knife.

To the expert worker more difficult
Difficult things come easily, such as the straight-
Work ening of crossed eyes, the removal of half-closed eyes and the insertion of eyes that are as attractive as they are interesting, the changing of an unsightly shirt-waist into a fashionable low-cut bodice, the insertion of a background or the making of all manner of changes in accessories, and so on *ad infinitum*. For all these things, whether simple or difficult, the reader needs only a set of suitable knives, the knowledge of what the individual negative requires, and skill in the use of the knife. With these, the knife is quite as useful a tool as the pencil.

**For all Sorts
of Subjects**

I have referred to the usefulness of the knife in the improvement of portrait negatives only, but it is obvious that there is a still larger scope for the use of the knife in the improvement of view, architectural, and landscape negatives. This includes the softening down of obtrusive light-patches resulting from any cause, or a distracting bit of white sky, harshly defined lines in a building, the deepening of weak shadows, and the like. In the end it comes to this, that the average negative needs as much local reduction as local intensification, and the retoucher needs to be as expert with the knife as he is with the pencil.

**A Glance
Backward**

In the old, and narrow, view of retouching, this covered only the improvement of the negative by working on the film with a pencil, or with a brush and color or stomp and crayon powder on the glass side. I have endeavored to give the reader a wider conception of retouching methods, according to the ideals of today. Thus far we have discussed only those methods which should be employed, if employed at all, before any work is done on the negative with pencil or color. Only when the possibilities of these methods—of eliminating the necessity for retouching or of remedying the defects of the negative as a printing plate—have been exhausted, should the reader turn to the use of the pencil and brush. This is the logical sequence of methods, apart from the fact that chemical and physical local reduction will be much simpler and more successful if attempted on the clean negative than is possible after the negative has been prepared for retouching with a pencil and subjected to much handling in the actual retouching processes. This much being clear, we can now take up the equipment for and methods employed in retouching with pencil and color—on the film and on the glass side or back of the negative.

**—and
Forward**

Efficiency in equipment and comfort in working conditions have much to do with success in retouching and improving the negative. It is difficult to retouch a negative properly if you simply hold it up to a window, or prop

it up against a pile of books, or work at a desk clumsily improvised out of a soap-box—all of which methods have been advised as ways of saving the hard-earned dollar. The work calls for close attention to petty details and deals with fine differences of density in color, so that a brilliant, but soft and steady light, a comfortable desk or table without any possibility of shake or movement, and a fairly wide assortment of tools and working conveniences are essential.

A Retoucher's Outfit A retouching equipment may seem to comprise many items, but they are inexpensive and can be gathered together at a cost of less than \$5, and, once in hand, will last a lifetime. Such an equipment should include a permanent or portable desk, a few pencils, brushes, small paper and chamois stomps; two or three cakes of water-color, a tube of opaque, three flat pill-boxes filled respectively with black crayon powder, powdered black lead or "stove polish," and powdered gum arabic; two carefully chosen etching points or knives; a piece of emery cloth for pointing pencils; a bottle of retouching medium and another of a reliable ground-glass varnish; a few pieces of soft, well-washed linen or cotton, and a small glass tumbler to hold water. If the reader protests against all these multifarious items, let him begin with the desk, a bottle of medium, and a 2H pencil, and add the other items as he needs them. Maybe he will find the need of them all in the first half-dozen negatives.

As far as the desk is concerned, the amateur may well content himself with a portable desk, such as is sold by dealers at \$1.50 to \$3.75. See Figs. 1 and 2, Plate I. In buying this beware of the lightweight, flimsy desk. Choose one of fairly stout construction, fitted to take negatives 8 x 10 or smaller. A piece of finely ground glass and another of plain glass should be fitted to the inclined frame of the desk upon which the negative rests when it is being worked upon. A piece of white cardboard, renewed from time to time, is preferable to the cheap mirror often fitted in the base of such desks. The hinged hood of the desk, which is supported at a con-

PLATE I

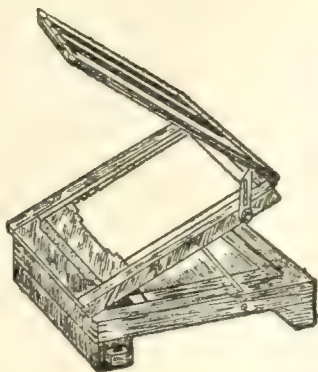
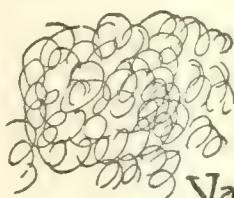
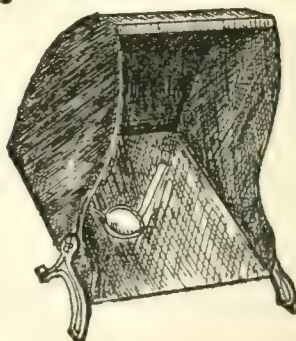
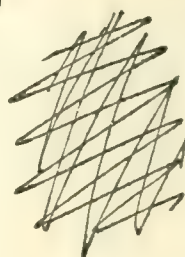
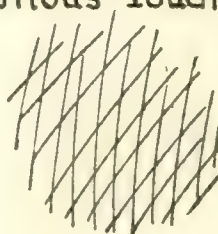
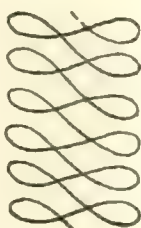


Fig 1. Normal Desk

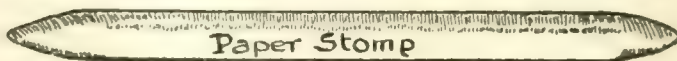
Fig 2. Desk, with hood



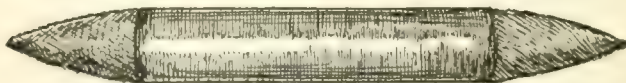
Various "Touches"



Tortillon



Paper Stomp



Chamois Stomp

venient height over the inclined frame to shield the eyes from extraneous light while working, may not be large enough to properly fulfil its purpose. In such a case, fix a larger piece of cardboard to the top of the hood with a drawing-pin, and then drape over this a piece of opaque fabric of any kind. The object here is to form a dark recess of comfortable working size, within which the retoucher views and works upon the negative with all the light reflected through the negative. In use, the desk is set up on a table of convenient working height, thoroughly rigid and steady on its legs, near a window with a northerly aspect, so that the steady light will fall directly on the reflector in the base of the desk, being reflected thence through the negative.

A Professional's Desk For professional work, where there is a steady stream of negatives day by day, it is wiser to provide a permanent desk or table for the retoucher. This should be located at a window, preferably with a northerly aspect, in a quiet room where the work can be done without vibration or interruption. The general workroom of the studio is not such a place. Generally a little room can be partitioned off the printing-room for the purpose. Presuming such a room to be available, let me describe an ideal equipment which I found in the home studio of Charles H. Davis here in New York. The window was set in a fairly deep recess about 4 feet wide, between the projecting chimney shaft and the corner of the room. A heavy shelf, fixed across this recess at a convenient height from the floor, gave a roomy base or table for the desk, with ample free space beneath. The upper third of the window was permanently darkened, and at the base of this dark space a crosspiece of wood was securely fixed to the window-frame. To this crosspiece was hinged a board about 30 by 60 inches in area. This was set at an angle of about 30 degrees from the window, its lower edge resting on the shelf or table about 4 inches from the front, thus providing the inclined frame of the desk, having a rebated aperture about 10 by 12 inches at a convenient height from the table base, i. e., about 9 inches. Along the lower edge of this aperture a strip of wood was fixed to support

the negative while work was done on it. A piece of plain or ground-glass, fitted to the rebate of the aperture, served as a support for the negative when needed. The 9 inches of open shelf-space at each side of the inclined board gave ample room for negatives awaiting treatment (at the left), and for tools and conveniences (at the right). This open space at either side also permitted access to the back of the desk, between negative and window, for ventilation or cleaning the inside of the window. This arrangement, the best I have seen, afforded ample room and comfort for all kinds of work, whether retouching, spotting, blocking out, or preparing negatives for printing in any way. The desk was always ready for use; the worker sat undisturbed, with always ample light of a uniform character for his work and plenty of sitting room for comfort. Its cost involved an afternoon's labor and perhaps \$2 for lumber. At night a lamp or electric bulb could be adjusted behind the working aperture without any trouble whatever.

**The Working
Position**

Before leaving the desk, the working position of the retoucher needs a word or two. The correct position is to sit upright at such a distance from the negative that the head or face under treatment is seen as a whole. In other words, you look at the negative and not through any part of it, just as in looking at the picture image on the camera ground-glass. Thus, in retouching the lines or defects in the face, you do not attempt to see the actual touches or marks you are putting on the negative, but sit at such a distance that you can place the pencil-point properly and see the effect of the work done. Comfort and efficiency here mean a chair of the right height, with a moderately soft, but firmly upholstered seat, and a back with an adjustable pad fitting snugly into the inward curve of the retoucher's back. The modern office stenographer's chair is ideal for the purpose, as giving an aid in maintaining the correct position for good work and avoiding fatigue in working hours at a time. The general neglect of this detail of working position and the comfort of the retoucher is responsible for much poor work.

**Illuminating
the Negative**

The proper illumination of the negative is more important than is generally understood. Negatives, even those made in the professional studio, vary in density and color, and this calls for care to give each negative the illumination which it needs. Thus, presuming always a steady light of uniform intensity, such as that given by a northerly sky or an electric lamp, a thick, dense negative may require the use of a mirror reflector in the desk-base, in order to throw sufficient light through the negative to enable the retoucher to see just what is required of him, without undue strain upon the eyes. Conversely, a thin, gray negative, such as is common in these days of development or gaslight papers, is usually sufficiently illuminated by means of the white cardboard reflector, and may even call for the interposition of a piece of ground-glass or flashed opal glass behind the negative to strengthen the weaker details in the shadows of the negative. In working upon a very thin negative, care must be taken to exclude any distracting light reaching the eyes of the retoucher, either from the sides of the desk or behind. In such a case see that the hood of the desk really shields the negative from all light except that coming through it from the reflector. Similarly, in retouching a negative which is yellow in color, or working at night by a yellow light, a piece of blue-tinted glass placed behind the negative will neutralize the yellowness of the light and make for better results. A window facing the sun is the worst possible location for the retouching desk. Where this is unavoidable, screen the window with white tissue paper or blue-white tracing linen, such as architects use. But the work done under such conditions will be very uneven and tiring to the unlucky retoucher, because of the unevenness and varying intensity of the light as the day goes on. All these are little points, but deserve attention because of their influence upon the quality of the work.

**Avoiding
Eye-strain**

It is, of course, impossible to avoid a certain amount of eye-strain and tiredness after long stretches of retouching, even though the retoucher be young and blessed

with the best of eyesight. But this tiredness and eye-strain may be minimized by putting a little thought and care into one's work. Do not attempt to view the negative too closely, and avoid changing the distance between the eyes and the negative, which wearies the accommodation power of the eyes. As a rule, this distance should be that habitually used by the individual worker when reading—about 12 to 15 inches. The right distance for comfort and good work is that at which the retoucher can see the effect produced by the pencil, without the actual strokes or touch being seen at all. When the negative is thought to be finished, it may be examined more closely for any irregularity or coarseness which may have escaped the eye while working, but beware of adding too much of this "fine" work, as it is apt to give the negative a scratchy or "niggled" appearance. Many retouchers use a large reading-glass for this final touching, but it is a bad habit, and I advise against its use. A pair of spectacles, properly fitted by an oculist for this specific purpose, will give better results without the strain which accompanies the use of the reading-glass. Those who habitually use spectacles for reading will, of course, need no further aid. Careful attention to the principles set forth in the paragraph on the illumination of the negative will offset most of the tiredness and eye-strain likely to bother those who have normal eyesight.

Pencils The pencils used for retouching are generally purchased in the form of loose leads about 6 inches in length, and used in an adjustable holder of the same size and thickness as an ordinary lead-pencil. The leads known as HB, H, 2H, and 3H are sufficient for all requirements. For use, these are sharpened to a long, finely tapering point, which should project about 2 inches beyond the nozzle of the holder. This pointing is done by carefully rubbing the lead, with a quiet rotary movement, on a strip of emery cloth fastened to a thin strip of wood. The occasional fine pointing of the pencil, as it wears down in use, is best done on a piece of fairly smooth cardboard kept at hand for this purpose. The fineness or bluntness of the working-point is varied according

to the preference of the worker, the size of the portrait head being retouched, and the character of the touch desired—of which more later.

The best brushes for the retoucher's equipment are red sable water-color brushes of good quality, tapering to a fine point when wetted, and having a fair amount of spring in the point when this is pressed against a hard surface and quickly released. Three brushes, Nos. 1, 2, and 5, will be sufficient. They are used for spotting fine pinholes or small transparent areas in negatives, or for placing broad touches of color on larger areas where the pencil-touch would give a wiry or scratchy effect. There is an art in the proper handling of a brush. To properly charge it with color, first wet it with water and then squeeze out the surplus water by pressure against the side of the cup or container. Now gently rotate the brush-point over the color on the palette by rolling the brush-handle between the thumb and fingers. In this way the brush is properly charged with color at the point and will give just the right amount of color for the effect desired. Always wash and dry your brushes at the end of the day, so that they will be in good order for use when wanted.

The stumps needed are a few of the thin paper variety known as tortillons or spills, made of non-linting blotter tightly rolled to the thickness of a pencil and bluntly pointed, and one chamois stomp about the thickness of the little finger, illustrated in Plate I. These are used to apply crayon or lead powder to the film or glass side of the negative, the latter being previously prepared for this by being given a coating of ground-glass varnish or covered with papier mineral or any thin, tough, transparent paper. As an alternative to this use of powder and stomp, black, blue, brown, or red pencils are sometimes used for working on the glass side of the negative. These have a greasy chalk or composition which will "take" on the film or glass side of the negative without its previous preparation. Their use is to add density or emphasis at any desired part of the picture image where this would require more

lead than could conveniently be added with the retouching pencil. Where papier mineral is stretched over the back of the negative, as above suggested, and the work is done with stomp and powder, any excess of powder may be removed by means of a bluntly pointed piece of soft rubber. The new Eastman Portrait Films offer many advantages over glass negatives in this afterwork as they can be worked upon with pencil, knife, color, or powder on either side at will.

Varnish or "Medium" To prepare the film of a negative so that it will "take" the retouching lead, the portion to be worked upon is almost always given a thin coating of a retouching medium or varnish. This, when properly applied and allowed to get thoroughly dry, gives just the right surface for the pencil and does not change or alter the density of the negative. A two-ounce bottle of retouching medium can be purchased for twenty-five cents and will last for a year or more. The mediums made by Eastman Co. and the Autotype Co. are wholly reliable and convenient. Those who desire to make their own medium should dissolve $\frac{1}{4}$ teaspoonful of powdered resin in 2 ounces of turpentine and filter into a clean bottle. If this gets too thick, add a little turpentine; if it is too thin, leave the bottle uncorked for an hour or two, when some of the turpentine will evaporate. The right consistency is that of a thin (not heavy) cream. It is applied to the film side of the negative, and should cover only the part which is to be worked upon. This is done by stretching a small piece of soft cambric over the tip of the middle finger, wetting this with one or two drops of the medium, and lightly going over the negative with the tip of the finger in a circular motion, so as to leave a thin, even coating of the medium on the film, without streaks or thickened edges. The application of a soft rag wetted with turpentine will remove the medium (and any retouching done on the film) if this is desirable at any time. Be sure to let the retouching medium harden and dry before attempting any work on it with the pencil. This will take from twenty minutes to an hour, according to the temperature of the room. There are hundreds of formulas for retouch-

ing mediums in the books, containing everything from castor-oil to emery powder, but the simple mixture given above has served me well for more years than I care to count, and the reader need not experiment further.

Sizing up a Negative One of the first things to learn in retouching negatives with the pencil, brush, or stomp is how to "size up the negative." This simply means a preliminary study of the negative under favorable conditions, so that we get a general idea of what it needs before actually beginning work upon it. For this we place the negative in position on the inclined frame of the desk, and cover it with an opaque mask which has a cutout oval or pear-shaped opening exposing only the head and shoulders of the subject. Half a dozen such paper masks, with openings varying in size and shape, should be kept at hand for this purpose. Adjusting the mask over the negative, we seat ourselves comfortably at such a distance that the eye can view the negative critically, from a point slightly above it. Adjust the hood of the desk so that the eyes are shielded from all light except that coming through the mask on the negative. This will give us an altogether new view of the face. The texture of the skin and modeling of the head and face will be plainly evident, and we will quickly learn to note all the irregularities of density and other defects in the negative which require change or modification.

The Modeling of the Face We must remember that we are looking at a negative, i. e. that the transparent and semi-transparent portions of the film represent the shadows and half-tones in the face of the subject, and that the opacities or densities represent the lights, the combination giving us the modeling of the face according to the scheme of lighting adopted. All these relative values of light and shade must be carefully controlled or retained throughout the retouching now to be done, however much we may modify or remedy defects with the pencil, etc., since the personality or character of the subject is expressed in just these trifling irregularities of form and light and shade. Especially is it important to note and retain the minor, connecting shadows.

Let us take a typical portrait negative and look at it from the retoucher's point of view. It is presumed that the negative has already received all the treatment necessary in the way of general or local intensification and reduction by means of the chemical, abrasive, or "knifing" methods already discussed, so that we are here concerned only with such retouching, local intensification, or improvements as can be effected with the pencil, brush, or stomp. Our negative gives an almost full-face view of the subject, with the three-quarter lighting commonly used as giving the most favorable view of the average person. The light falls upon the head and face from above, slightly in front and from one side of the subject. This means that one side of the face is more or less brilliantly lighted, while the other is in half-shadow, but with the form and details of the features sufficiently shown.

First, we note many little transparent spots or areas of less density than their immediate surroundings, more or less sharply defined, according to the definition given by the lens used or the focusing of the image. If the face is freckled, every freckle will be very plainly evident in the negative, so that the face will present a mottled and irregular appearance not observed in a casual glance at the subject. But, these minor details apart, if the subject has been fairly well lighted, the head and face will stand out round and in pleasing relief, and the features will have their natural projection or recession.

There will be a soft shadow all around the edge of the face, even where this catches the strongest illumination; at the temples and where the hair meets the forehead; at the sides of the nose, and between the cheekbone and the lower jaw. Heavier shadows will be observed under the eyes; under the tip of the nose and around the nostrils; under the lower lip and under the chin.

The forehead presents an uneven appearance, combining little areas of density (lights) and shadow or half-shadow, differing in individuals, but usually showing

fairly well-marked highlights over each eyebrow. It is really a succession of curved areas of varying density. In persons of mature age there are generally more or less strongly defined lines or wrinkles, running laterally or vertically, denoting age, worry, thought, or eye-strain. A soft highlight runs down the ridge of the nose, with broader patches at the tip or on a prominent nostril or bridge. Highlights also mark the cheek-bones, the lower lip, and the chin. The prominence of these lights varies according to the projection of the features in different individuals. Almost always they are exaggerated by the scheme of lighting adopted or by defects in the character of the negative. It goes without saying that any lines, wrinkles, freckles, and other little differences of color in the face of the subject are exaggerated in the negative by faulty lighting, by the use of the ordinary color-blind plate, or by errors in exposure and development. The ideal portrait negative is one made on a color-sensitive plate, properly screened, with the subject given a soft, harmonious lighting, which has received ample exposure, and has been developed to the right density and color with a soft-working developer. In such a negative only a minimum amount of retouching will be necessary, with a saving of time, labor and likeness.

Preparing the Negative Before any pencil-work can be done on the negative, the film must be given a suitable surface so that it will "take" the lead readily and respond to the touch or stroke which is to effect the change of density needed. This preparation of the film is usually done about half an hour before beginning to retouch, so that the varnish or medium applied may become quite dry and hard. The retouching medium or varnish used for this purpose is not applied over the whole surface of the negative, but only over the face or other parts of the subject which need retouching. To do this, a drop or two of the medium is put on the part to be treated and at once spread in an even, thin film with a piece of soft rag or chamois stretched over the tip of the middle finger. Do not cover more of the negative than is necessary and see that the film is even, without

streaks or uncovered portions or ridges. Treat the arms, hands, or any other portion of the figure or dress in the same way. When the medium is thoroughly dry, the negative is ready to be worked upon. If the pencil clings or becomes coated in use, this indicates that the medium has not been allowed to thoroughly dry. If it does not respond or "take" the pencil properly, this indicates that the medium has become too hard.

For work to be done on the glass side or back of the negative with brush and color, or stomp and crayon, this is given a coat of any fine-grained, ground-glass varnish; or a piece of paper mineral, or any thin, transparent bond paper, is slightly dampened and then stretched over the back of the negative and attached to it by a thin edging of strong gum or fish-glue.

Smoothing-up the Face The treatment of the negative, in retouching with the pencil, differs somewhat in character, and very largely in amount of work done, according to the subject. In all negatives, whether of men, women, or children, the little semi-transparent spots or areas due to freckles, defects or discolorations of the skin, and any exaggerated lines or wrinkles must first of all be lightly touched or worked on with the pencil until they are pleasingly softened or, in some cases, made to disappear. This is called "smoothing-up" the face. It is as simple as it is dangerous. First, if overdone, the modeling of the face is flattened or lost. Second, if unskillfully done, the natural texture of the skin is ruined, being replaced by unpleasing scratches or a graininess resembling leather. Two points need careful attention: First, do not attempt to level every depression in the face up to the density of the surrounding part. Only actual facial defects, such as freckles, pits and the like should be softened to the point of disappearance. Second, learn to apply the pencil to the defect so that its only visible effect is the softening or disappearance of the defect, without the marks or touches being apparent to the eye. In portraits of men, the lines and heavier shadows, usually denoting character, should merely be softened, not obliterated or smoothed out of existence. The purpose of retouch-

ing here is to remove only the exaggeration of these incident to the photographic process, and to soften them so that they will not be more apparent or pronounced in the portrait than in life. In portraits of women, on the other hand, it is commonly understood that all lines, wrinkles, and facial defects of every sort must be completely removed, and the skin be given a soft, smooth texture in every part of the face.

**Touch or
Stroke**

This preliminary "smoothing-up" of the face, with the neck, bust, arms, and hands, when these are shown, brings up the question of the "touch" or "stroke," in which many beginners in retouching find a formidable difficulty. Let us settle this difficulty in the beginning by saying that it is almost wholly imaginary and arises from a misunderstanding. Most beginners start with the mistaken idea that they must so work upon the film of the negative that the skin will be given an even, uniform grain or finish, such as they see in the average professional portrait. This, they imagine, is produced by the use of a definite "touch" or pencil-stroke of definite form, peculiar to the skilled retoucher. It is not. There is no definite "touch" or stroke in retouching. The skilled retoucher gives his portrait negatives the much-admired finish by any sort of "touch" or "stroke" which will give him the effect he seeks at any given point in the negative. Of course, as in handwriting, every retoucher in time acquires a certain individuality of "touch," so that the work of one is easily distinguished from that of another. But there is no single, correct "touch" such as the beginner seeks to acquire. A few of the "touches" or "pencil-strokes" used in retouching are given (much exaggerated as to size) in Plate I. The skilled retoucher may use all of these in retouching a single head, or he may evolve a distinctive "touch" of his own which will give him the effect produced by any one or several of the "touches" illustrated or suggested in Plate I.

**An Ingenious
Tool**

The acquiring of an effective touch or stroke has been much simplified by the recent introduction of an ingenious lead-holder invented by Rolland E. Green, of Hastings,

Mich. This instrument, adaptable for hand or machine use, consists of an inner lead-holder working within an outer, loose sleeve - holder similar to the ordinary retouching pencil. With this, the hand simply guides the pencil, the side rotary motion of the inner holder giving the desired touch or stroke. The device is thoroughly practical and deserves investigation by the professional worker.

**Proficiency
in Touch**

The best way to acquire proficiency in touch is to obtain a few waste portrait negatives and practise upon them until you reach an understanding of the different effects required and how to get any desired effect with the least amount of work. Thus you will learn that a hatch-like stroke of some firmness and character may be best for the breaking up or softening of heavy, well-defined shadows or lines, and that a small, circular movement or series of fine curves will give you the effect needed in obliterating the smaller facial defects, such as freckles, or for softening the edges of wrinkles or lines. Do not attempt to get any definite grain in this early work, but confine yourself to the immediate purpose of softening a shadow, bringing a freckle area up to the density of the part of the face immediately surrounding it, and so on. Good practice of this sort can also be had in odd moments by cutting small pieces of even gray tint from a half-tone engraving and reproducing the tint as closely as possible with a finely pointed pencil on white paper. The touches made on a negative of ordinary size are, of course, so small that they can hardly be seen, separately, from the distance at which the retoucher works. It is, in fact, fatal to good work to attempt to see the touch; what one must see is the effect produced as the touches are multiplied in the area under treatment. It will be apparent from this that not only must the touch vary according to the effect needed, but that the pencils used must vary in degrees of hardness or softness and in the shape of the point with work which differs in character. The use of too hard and too finely pointed pencils is a mistake common to beginners. The proper practice is to use as soft a pencil and as blunt a point as will give the

desired effect with the least possible number of touches at any given point. The manner of holding the pencil and the movement of the wrist in making the touches have much to do with the effect produced. Hold the pencil loosely, but with perfect control, and let the movement of the wrist be free and supple, with the forearm practically still.

**A Critical
Survey of the
Face**

When the reader has finished the blending or smoothing-up of the face by filling in the freckles and similar blemishes, it is well to sit back and look again at the face as a whole. The purpose here is to get a thorough grasp of the modeling of the face and the scheme of lighting employed, so that these shall not be confused or lost in the work now to be done on the separate features. With this should be combined a careful observation of the more delicate shadows, such as those at the side of the nose, on the upper lip, running from the ear to corner of the mouth and separating the highlight on the cheekbone from the broader light on the jaw, the shadow running from one highlight to another on the forehead, and so on. These incidental shadows differ much in different individuals. It is vitally important that they should be retained as they have much to do with likeness, apart from their value in indicating the muscular structure of the face.

Forehead

Let us now begin our work on the forehead. The lines running across, and especially the short vertical lines from the root of the nose, are generally exaggerated in the negative. In portraits of men they should only be softened in force, not entirely removed. This is done by using a small criss-cross or hatching stroke, and then running a series of elongated figure-eight strokes along the center of the shadow at its deepest part. Do not touch the slight ridges which bound the shadow at the top and bottom, simply connect them by your stroke. When the line has been softened as directed, any little transparent areas which remain may be brought to the desired density with a light touch of the pencil moving in a series of tiny, loosely connected curves. If we are dealing with the portrait of a child

or a woman under sixty, then it is wiser to remove all lines from the forehead. This does not mean making the forehead one even, smooth surface. Work over the line with the hatch-stroke to reduce its transparency, using a pencil not too hard and somewhat bluntly pointed; then fill the spaces remaining with a circular movement of the pencil, running loosely and fairly quickly from one end of the line to the other. Finally, with a rather harder pencil, fill in the unevenness with a very small hatching stroke. Be careful to follow the natural conformation of the forehead, keeping all the lesser shadows connecting the lights. If this is not done, the forehead will assume a tight, rigid appearance which is altogether undesirable. The vertical lines between the eyes should be very much softened, but not wholly removed. The lights over the eyebrows may be given definite and pleasing shape by a few light strokes connecting them with the shadow at the temples and nearby depressions, but the pencil should not touch the highlights themselves.

In portraits of women it is usually
Eyebrows desirable to give a definite arch to the eyebrows and to lessen their breadth or heaviness when this is apparent in the negative. In doing this, avoid giving the edges a hard, cut-out appearance; the use of the figure-eight stroke, broken by a series of hatching touches, will give the desired softness of outline.

The softening of the lines and wrinkles
Eyes about the eyes will call for firmness of touch. Use the hatch-stroke to soften the sharpness of definition; then work along the wrinkle with a tiny circular or spiral touch until it almost disappears. Care is needed here not to put on too much lead, thus obliterating the natural shadow under the eye. Lift the pencil as it touches the edges of the line or wrinkle. In softening "crows' feet" and the network of lines which are often found forming a sac or bulging fulness under the eyes, much careful work of this sort may be needed, but if the reader will be careful not to forget or lose the anatomy of the face, he will find these unsightly blemishes vanishing as he softens

and fills in the more or less transparent lines which emphasize them. Keep the natural shadows, and the modeling will take care of itself.

In the treatment of the eyes, the ridge forming the lower edge of the socket will sometimes need softening to reduce its prominence. This of course should be done with the knife before the negative is prepared for pencil-work. In the same way the light on the iris of the eye, the catchlight as it is often called, may need shaping with the knife. No attempt should be made to work on the eye itself with the pencil; when this is done the result is invariably a sharp outline, giving stiffness and rigidity to the eye.

Noses Observe the shape of the nose carefully before touching it with the pencil.

Remember that the bone extends only one half its length, after which comes a cartilaginous portion ending in the tip and nostrils. Any attempt to carry the line of light along the entire length of the ridge will therefore destroy the shape of this feature. See that there is a break in the line where the bone ends, and that the character of the line below this point is softer than the line over the upper half. The shadow between the line of light along the ridge and the half-light where the nose merges with the cheek should also be carefully retained. This shadow practically determines the apparent width of the nose. The line of light which naturally runs along the ridge indicates the characteristic shape of the nose. Where this needs correction, a note of emphasis here and there may be given to secure the effect desired, but every touch of this sort is apt to stiffen and broaden the nose, so that care should be exercised not to alter the shape too violently and so lose likeness. If the nose is hooked, keep the highlight on the tip well up by a few upward strokes, which will tend to straighten it; but a nose of this sort will usually need preliminary treatment with the knife before the negative is made ready for pencil-work.

Cheeks The less work done upon the cheeks the better. Blemishes, pits, and freckles, of course, should be removed, and the lesser depressions and inequalities made less noticeable,

but it is important to keep the natural form and roundness of the cheek-bone and the edges of the face. In rounding the light on the cheek-bone be careful not to extend this upward and so destroy the delicate shadow where the cheek curves in to the eye. The soft shadow under the cheek-bone, extending from the ear to the termination of the mouth, should also be carefully kept. That portion of the cheek which approaches the mouth should hardly be touched by the pencil, as it is apt to catch the light by its natural fulness, and any pencil-work will only accentuate this. Where the subject has deeply sunken or furrowed cheeks, these undesirable shadow masses should, of course, be softened and almost removed, except as far as may be necessary to preserve likeness. Similarly, the heavy lines extending from the nostrils to the ends of the mouth—oftentimes met with in the form of broad, heavy shadows—will need softening. Here it is essential to keep the natural form of the line or shadow, merging it very softly into the shadow at the termination of the mouth. The touch or stroke here should be vigorous and not scratchy or niggling in character—first the cross-hatch to soften and then the spiral curved touch to finish.

Next to the eyes, the mouth is the most difficult feature to manage. The golden rule is to do as little work as possible. The half-shadow on the upper lip should be carefully preserved, and the curves of the lip, if touched at all, should be suggested rather than plainly drawn in with light touches of a not too finely pointed pencil. Any breaks or imperfections on the lips should be deftly filled, care being taken to use a small, loose touch, so as to avoid the appearance of stiffness or hardness. Every touch should be a curve. Remember that the upper lip is always in shadow and should never be penciled to equal the lower lip in density. The lower lip will generally call for careful treatment with the knife rather than pencil-work, since it catches the light and its fulness is exaggerated in the negative. The shadows at the terminations of the mouth may be softened at the edges, any downward tendency being softened almost to removal. Where it is possible to

give these shadows an upward tendency, so that they seem to merge with the line of shadow running down from the nose, this will give the subject a happier expression and tend to remove any suggestion of severity about the mouth.

Like the nose, the chin should be carefully studied before beginning work on it with the pencil. Generally it will be seen to have been enlarged and made more bulky than in life by lack of skill in the lighting, or by reason of catching too broad a light. In this case, every touch of the pencil will extend its bulk save where the touch is so placed as to gently emphasize the highest light. This note of emphasis and the smoothing-up of defects should be the limit of the pencil-work. Otherwise, the knife will be found very useful in reducing the force of the scattering lights and strengthening the shadows.

The Neck and Bust The neck and bust in portraits of women and children offer little or no difficulty. Heavy lines in the neck, caused by the abrupt or forced turning of the head, will need filling in with the pencil, and possibly the use of the knife or abrasive pencil to reduce the rounded ridges or folds which catch the light. It is not difficult to give a pleasing roundness to the neck by means of knife and pencil—the knife to reduce the excessive width or fulness, or introduce a line of shadow near the edges, and the pencil to emphasize the light where this is indicated by the lighting employed—provided one has a little knowledge of the muscular structure. The pencil should not be too hard nor the point too fine for this work, and the touch will run from cross-hatching for the filling of the heavier shadows to a loose, circular movement to add firmness and emphasis to the natural curves. The work on the bust should be confined to the upper portion, relieving any disagreeable flatness or boniness of the chest, reducing the over-prominent collar-bone, and giving just a suggestion of plumpness to the line of the shoulder where this is shown. The common practice of exaggerating the soft fleshiness of the bust in portraits of women needs only mention to be condemned. Sometimes the knife can be usefully

employed in giving more desirable shape to the curve of the neck and shoulders; but this should only be attempted when the worker has thoroughly familiarized himself with the use of the knife. The greatest care is needed to preserve the delicate shadows at the base of the neck and those between this point and the shoulders.

Arms and Hands The arms and hands will rarely need more than smoothing-up with the pencil, first removing all noticeable blemishes in the skin, then blending the areas of uneven density with an upward, curving stroke to supplement the lighting. If there is a pronounced hollow at the elbow, it may be softened, but do not fill it overmuch. Sometimes the knife may be needed to gently curve the elbow, or to add suppleness and grace to a thick wrist, or to ever so slightly shape fingers that are unsightly, but this should be avoided where possible by skillful lighting. Noticeable veins or prominent knuckles should, of course, be softened with careful pencil or knifework, but do not overdo and so call attention to the hands which should always be more or less subdued in tone.

The Hair No attempt should be made to retouch the hair, beyond removing the stray hairs which catch the light outside of the head and are generally much magnified by being out of focus. In exceptional cases it may be necessary to strengthen the lights on the hair, which is done with a soft, bluntly pointed pencil on the film, or better, with a crayon on the glass side of the negative previously coated with ground-glass varnish. Similarly, it may be necessary to remove distracting lights on the hair, or to slightly change the outline of the head. This calls for knifework and should be done before the negative is prepared for retouching.

Working on the Back of the Negative It will often happen that the preliminary survey of the negative before retouching is begun will reveal considerable work which can be better effected by means of brush and color, or stomp and crayon powder, on the back of the negative, than by pencil-work on the film. It is possible to avoid a lot

of tedious pencil-work in this way provided one has skill in the handling of brush and stomp. For this one needs first to learn how to prepare the back of the negative for working upon. To do this, thoroughly clean the glass side of the negative. It may then be coated, by flowing, with any fine-grained ground-glass varnish and, when thoroughly dry (which may take two hours) is ready for use. Or we may stretch papier mineral, or any thin, tough bond paper over the back of the negative. This paper should be as transparent as possible, cut to size, and slightly dampened. It is then touched with strong gum or fish-glue around the edges, and made to adhere firmly to the glass side of the plate. When quite dry it will afford a splendid surface for working on with color or crayon.

In either method the negative is placed on the inclined frame of the retouching desk, with the back of the plate uppermost, after all the retouching necessary with knife or pencil has been finished. Whatever strengthening it may need, such as the addition of a slight tint over a shadow area or the emphasis of highlights or other details, is then effected. If the ground-glass varnish has been used, the work is done with a soft pencil, crayon point, tortillon, or stomp charged with crayon powder, or any similar means which may suggest itself. In the case of a paper-backed negative we may use a brush and water-color, colored pencil or crayon, or stomp and powder at will. If the reader has grasped the principles of retouching and improving the negative already discussed, he will need no detailed instruction in this working on the back of the negative. It is simply a method of local intensification and skill comes from practice in the use of brush, pencil, or stomp. Ground-glass varnish has this advantage over paper as a working surface that it enables the worker to add or subtract tones or densities at will, by the restraining power of the varnish coating itself, or by giving this a thin, even tint of powder or dry color, or by scraping off the varnish at any desired part. The Eastman Portrait Film offers special advantages for this working on both sides of the negative.

Finis To sum it all up in a few words, the whole art of retouching and improving negatives consists in the ability to recognize just what a negative needs (1) to make it a better printing plate, or (2) to make it give a print which will please the person for whom the portrait is made, and in the ability to make these changes by working on the film or glass side of the negative by chemical or physical methods, or by the use of pencil, brush and color, or stomp and powder. Beyond these there are the methods of dodging or controlling the negative in printing, by the choice of the right printing paper or printing process, or by the skillful use of diffusing screens and means of local control in the making of the print.

BOOKS

THE ESSENTIALS OF RETOUCHING: FINISHING PRINTS IN BLACK AND WHITE AND COLORS. By G. Hamner Croughton. 1917. 46 pages; 12 illustrations. Cloth \$1.50.

ARTISTIC RETOUCHING. By Clara Weisman. Illustrated. \$2.50.

THE PHOTO-MINIATURE NOS. 116 and 126 (out of print but accessible at many libraries) also contain much valuable information for the retoucher.

Special Call for Protar Lenses

The Signal Corps of the United States Army has sent me a special request to publish its immediate need for every available Convertible Protar lens, Nos. 11 to 19 inclusive, in the country. I hope that every reader of the PHOTO-MINIATURE possessing any one or more of these Convertible Protars will at once place it or them at the service of the Government. Full list prices will be paid for all lenses accepted. It is possible that, unless sufficient of these lenses are voluntarily enlisted on this appeal, they may be commandeered, as large numbers have been sold in recent years and are doubtless still in this country.

There is no more glass of the kind essential to the manufacture of these lenses, so that those who have Series VIIa Protars can materially help in the winning of the war by turning their lenses over to the Government in response to this special call. If you know of anyone owning such a lens, tell him of this appeal and persuade him to enlist his lens in the service of the country.

It is necessary that the lenses be obtained without delay. If you have such a lens, send a fully detailed description of it and price desired to the Chief Signal Officer, Signal Corps, Granite Building, Rochester, N. Y.

War Savings and Thrift Stamps

It is undeniable that photographers, as a class, are prospering by the war. Everywhere photographers are busy—more than busy; cannot cope with the volume of business coming to them directly from the war, cannot get “help” sufficient for their needs, and so on. Every soldier, sailor, officer, and war worker must be photographed before leaving for the training camp or overseas service, and every mother’s son of them wants photographs of the dear ones left behind. The photographer is accumulating wealth, as he never did before, from this sudden and universal demand for his product. This is as natural as it is inevitable. No one can blame the photographer for taking advantage of his good fortune.

The National Government, while placing all manner of restrictions on other businesses, has left the photographer unrestricted and undisturbed. His product, unlike many other luxuries, carries no special tax, and thus far there has been no suggestion of price regulation in his industry. He is assured of an ample supply of all essential raw materials, and the price of these has not been increased in any degree corresponding to the increases in other lines of business.

This triple good fortune, however, brings with it a new responsibility. The Government expects the photographer to do his duty—in using his surplus wealth to help win the war. Especially the Government expects those who profit by the war in a special way to invest their gains in Liberty Bonds and War Savings. The photographer who is not putting all the money he can spare into Bonds or War Savings is not a loyal American but a plain slacker.

The War Savings and Thrift Stamps campaign has

an especial appeal to the photographer. He makes his money by "sittings" and various sorts of "specialties." His product is sold and paid for "per unit." It should be the simplest plan in the world for him to link his war savings to the scheme of his business, e. g. to buy a 25-cent Thrift Stamp or \$4.20 War Savings Stamp on the entry, or payment of each unit order. Or he can easily pledge himself to invest in one or other form of these war savings a definite percentage of his daily or weekly receipts.

Are photographers doing their duty in this matter? We see much in print and hear much at conventions of the splendid part photography is playing in the war, and of the large percentage of photographers with the colors. But this word is for the photographer who is permitted to stay at home and accumulate riches from the war, without the obligation of fighting to win.

Mr. E. B. Core, Chairman of the Greater New York Photographic Division of the National War Savings Committee, tells me that the Government has assigned \$150,000 as New York's photographic quota in this War Savings and Thrift Stamp campaign. Of this quota only \$17,000 has thus far been taken. It is not a creditable showing for such a body of men as the photographers of Greater New York. Perhaps the poor showing is only a lack of record or organization. Then let them get together and put themselves on record in the right way. Write Mr. Core, at 74 Landscape Avenue, Yonkers, N. Y., and tell him what you are doing in the campaign. Pledge yourself to buy to the limit and keep your pledge. It is your war in more senses than one. Help to win the war by backing your Government with all your resources—but get yourself on record for the credit of your profession.

Books and Prints

PRACTICAL ART ANATOMY. By E. G. Lutz. 252 pages; profusely illustrated. Cloth \$1.50. New York: Charles Scribner's Sons.

The photographer who seeks a practical knowledge of the anatomy of the human figure, as far as this concerns the artist, will find in this meaty handbook just the information he needs. Mr. Lutz has a gift for teaching, and his treatment of his subject is characterized by that directness and simplicity of expression which marked his earlier handbook to "Practical Drawing." The hundreds of line sketches illustrating the text ensure the immediate comprehension of each lesson and add very largely to the practical value of the book.

WHEN THE SOMME RAN RED. By A. Radclyffe Dugmore, F.R.P.S., Captain King's Own Yorkshire Light Infantry. 285 pages; illustrated, maps. Cloth \$1.50. New York: Doran Company.

Of the making of books about the war there is, as yet, no end; but to the thousands of American and British amateurs who are acquainted with the Radclyffe Dugmore of "Camera Adventures in the African Wilds," "The Romance of the Caribou" and other books of photographic sport, the volume here noticed will surely have a peculiarly intimate interest.

It is frankly announced as a record of Captain Dugmore's personal experiences and observations, and makes no attempt at critical estimates or preachments. The early chapters tell of the author's adventures as a civilian photographer "on his own" in Belgium during August and September, 1914. Here, in company with Arthur H. Gleason, he was taken prisoner by the Germans, freed and, later, wounded at Alost while

photographing under fire in the streets of that town. Returning to England, he enlisted and, after training with the Inns of Court Training Corps, received his commission and joined his regiment in France in March, 1916. Thereafter the larger part of the book is concerned with a graphic account of the first battle of the Somme, July 1 to 15, 1916. It is a lively story, crowded with interest and breathless pages in which grim and humorous tales go side by side. At Mametz Wood, near the village of Bazentin-le-Petit, Dugmore's regiment found itself in an inferno of fire and phosgene gas, and here he received the injuries which ended his active service at the front.

The illustrations are numerous and varied in interest, the end papers reproducing a painting of the battle and panoramic sketches by the author.

HOW TO MAKE LANTERN SLIDES (Practical Photography Series: No. 7). Edited by Frank R. Fraprie. 74 pages; diagrams. Paper covers, 35 cents; cloth, 75 cents.

Like the other numbers in this popular series, this provides a simply written and complete guide to the making of lantern slides. The various methods and formulæ are given with commendable detail and fullness, so that the beginner will find in its pages a very practical course of instruction worth many times its cost. It is the only handbook at present available on its subject and deserves a large sale.

OPTICS FOR PHOTOGRAPHERS. By Hans Harting, Ph.D. Translated by Frank R. Fraprie, S. M. 224 pages; diagrams. Cloth. \$2. Boston: American Photo Publishing Co.

Mr. Fraprie deserves the thanks of all English readers for this translation of Dr. Harting's handbook to photographic optics, which first appeared in *American Photography* and is now available in a compact volume at a nominal price. Despite its enemy origin, it contains a lot of useful information about the fundamentals

of optics for photographers, together with a more or less complete account of the principal types of photographic lenses now in use or introduced during the past quarter of a century, and it is the only comprehensive statement on the subject published within the last five years or more. The amateur and professional who would be well informed about the choice and use of lenses for different classes of photographic work will do well to get this book and give it the test of a winter's reading, questioning, and thinking.

The concluding chapter gives many helpful tables and optical formulæ for everyday use and an unusually full index adds to the value of the book.

PHOTOMICROGRAPHY: AN INTRODUCTION TO PHOTOGRAPHY WITH THE MICROSCOPE. Fourth edition, revised. 36 pages; illustrated. 15 cents. The Eastman Kodak Company, Rochester, N. Y.

Interest in photomicrography among photographers, although hardly widespread, is apt to be somewhat intense where it exists. As one consequence of this there is a quiet but steady demand for definite and specific instruction on the subject. To give this sort of information in a general textbook, without seeming to indulge largely in the advertisement of a particular maker's goods or apparatus, is, to say the least, a difficult task. For which reason it is fitting that the manufacturers of the specialties so peculiarly essential to success in photomicrography should themselves issue practical handbooks dealing with the proper use of their products. This is exactly what the writer of the handbook here noticed has done for the photomicrographic specialties manufactured by the Eastman Kodak Company. It is a thoroughly practical and helpful guide, and as such should be carefully read and well digested by those who employ photography with the microscope.



“A Garden Tea”



“The Greeting”

PLATE II.—Photographs by Charles H. Davis



"Motherhood"

"Arise"

PLATE III.—From paintings by unknown artists



Miss Elsie Ferguson

by Charles H. Davis



PLATE IV

See references in text pages



PLATE V

See references in text pages



PLATE VI

See references in text pages

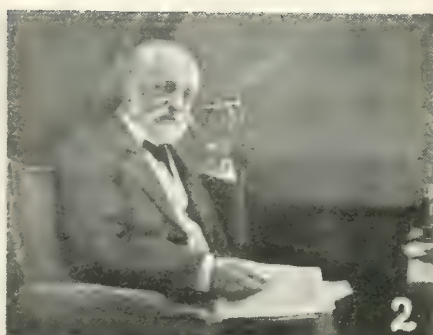
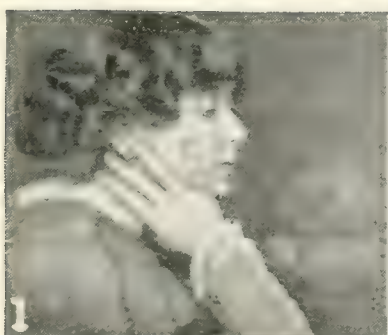
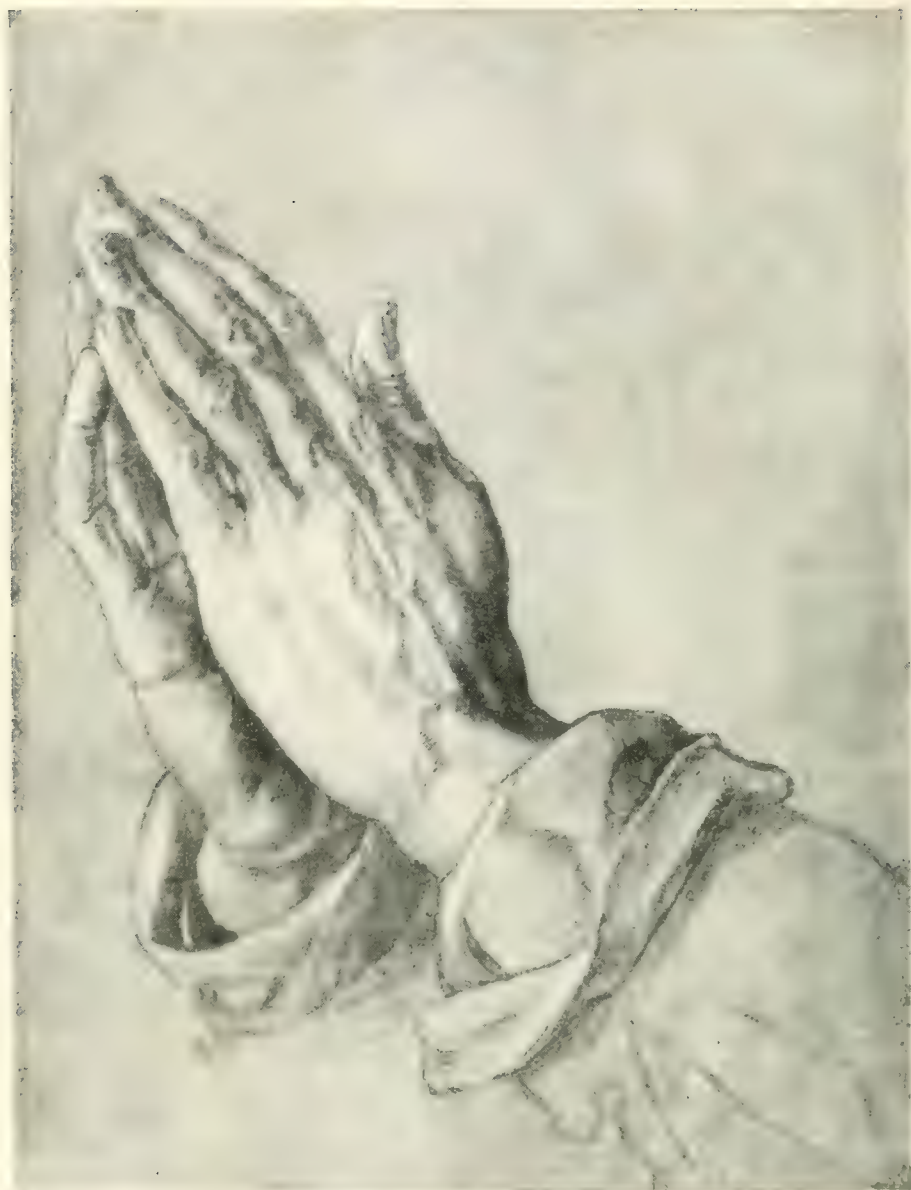


PLATE VII
See references in text pages



PLATE VIII
See references in text pages



The Praying Hands

PLATE I.—From a study of the hands made by Albrecht Dürer
(1509) for the Heller altarpiece

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The Hands in Portraiture

In the publication of the monograph which follows this foreword, the reader has an illustration of the pains and penalties which attend the pursuit of an ideal. When THE PHOTO-MINIATURE was first planned, the treatment of the hands in portraiture was among the twelve subjects proposed for the initial volume of the series. That was in 1899. During the almost twenty years which have passed since then, I have made three attempts to find the photographer who could do the book—and thrice failed. There was one who spent a summer in the preparation of a collection of "Hands I Have Photographed," which was not what I wanted. Another mislaid the mass of notes and illustrations I had accumulated as a basis for the book, and confessed his inability to go on without the lost material. The third went out into that far country from which no traveler returns, leaving his work unbegun. Thereafter I chanced to renew an old acquaintance with Mr. Charles H. Davis, the distinguished New York photographer, who, under the firm name of Davis and Sanford, delighted the fashionable world of Fifth Avenue in the nineties with his beautiful portraits of ladies of quality.

When I first met Mr. Davis, he was an amateur noted for his skill in the composition of the figure. His work was remarkable for its beauty of line and pose, a fine taste in the treatment of the hands of his models, and an uncommon elegance in the management of the

terminations of the figure. When he entered the field of professional portraiture, the ability to put these qualities into his work quickly won for him an enviable reputation as a photographer who could make charming portraits of women. At a first glance through his portfolios, one gets the impression that all his sitters of the gentler sex were beautiful women. This is not, as is often the case, due to excessive retouching or the fussy elaboration of draperies, but to an originality and mastery in pose—and especially in the treatment of the hands—by which he imparts to his sitters an air of distinction and refinement well calculated to appeal to a woman's heart.

Seeing this, my mind quickly turned to the possibility of persuading Mr. Davis to undertake the making of this long desired book about the hands in portraiture. I broached the subject; there were many difficulties in the way, but the promise was given and here we have the book at last. I do not know where one could find a photographer better equipped for the adventure. Skilled in technique and long accustomed to the difficulties involved in the pictorial interpretation of the human figure with the camera, Mr. Davis, as he tells us, has been obsessed by the hands, and has given them the most careful attention in his work. His great facility in hand posing has been based upon constant study and observation of the hand in everyday life, and in the art galleries of this country and Europe, accompanied by assiduous practice in his profession. A prominent art critic has said: "Mr. Davis is the only photographer who *always* gives that attention to the hands in his portraits which they deserve." In the following pages he has set forth the practical teachings of his knowledge and experience with a directness and enthusiasm which reveal the student and the master in one. It is, as far as my knowledge goes, the only book upon its subject, and the subject is one concerning which there is urgent need of plain and practical information and instruction.—EDITOR.

The portrait photographer's obligation to the world is not entirely a commercial obligation. In its origin

photography was not commercial. It is true that the photographer must make a business of it in order to gain a livelihood, just as all the great masters in art have done. But this is not to say that his product must be a commercial product in the everyday sense of the word. It should not be. Photographic portraiture is an art in so far as the photographer is himself an artist; and the photographic portrait is a work of art in so far as it reveals the spirit and exemplifies the principles which separate this sort of work from that which is frankly and obviously a commercial product.

Portraiture— In his work the portraitist must of
an Art necessity bring forth beauty or ugliness.

He has not the choice of giving the world a neutral product. There is no middle ground—a condition as true in art as in morals. He must be of those who make the world more beautiful or more ugly. Consequently he must grow in knowledge, and study ceaselessly to make his work more interesting and more beautiful. And it is chiefly by a constant study and observation of the grace and charm of the human figure, and next to the face those most expressive parts, the hands, that he can add the quality of interest, dignity, and charm to his portraits.

Its Outstanding The neglect of the hands by the
Weakness photographer is the outstanding weakness of the portraiture of today. Many

photographers, in frank acknowledgment of their inability to master this detail in their work, confine themselves entirely to the so-called bust portrait, showing the head and shoulders only of the subject. This is a mistake. *Pictures* cannot be made by portraying the head alone; there must always remain the disturbing element of incompleteness in such work. Likeness, the vital element in a portrait, resides not in the face alone, but is everywhere revealed in the body, in its terminations—the hands and feet, in attitude, and in the carriage of the person whether in action or repose. Especially is the characterization of personality revealed by the hands, as may be seen in the illustrations accompanying this discussion, or in the study of the portraits in any public gallery. And we get the

key to the art of it in that saying attributed to Goethe: "Art—it is the simple and the sane."

**Too Many
"Heads"** Too many photographic portraits are little more than identification pictures, giving nothing more than a realistic map of the face and head. As characteristic interpretations of the personality of the subject, they are at best fragmentary and incomplete. They give us a glimpse of the person who sat before the camera, but they are unsatisfying as portraits. A full- or three-quarter figure gives us a more interesting, because more complete, view of the subject. Sometimes a full-length back view of a friend is more valuable as a likeness than the head-and-shoulders portrait now in vogue. The public generally is awakening to this fact, and it is going to be increasingly difficult to satisfy the discriminating patron with a mere presentation of the head alone.

One of the most expressive pictures of a group which I can recall was a drawing by A. B. Frost, entitled "The Sea Serpent." It represented twenty or thirty people gathered on the crest of a hill overlooking the sea. Not a face was visible, yet nearly every human emotion was eloquently depicted in the figures of the group. I learned more about the expressiveness of the human figure and hands from that picture than from any hundred I have since studied. This particular example may be found in a back volume of the *Century Magazine* and is worth looking for at any city library.

**The Hands in
Expression** Upon one occasion, at a rehearsal, Miss Mary Lawton, the charming actress, was complimented by Mr. Belasco on her use of her hands. She said in reply: "I realize their dramatic importance. The hand is one of the most potent factors in the art of expression."

Daniel Chester French, the sculptor, in speaking of hands (as reported in the *New York Sun*) said: "We can study the perfection of the use of the hands and arms in the art of France and Italy. Duse and Bernhardt, of all the great actresses, make the most profound impression upon me. They are too great in technic-skill to overlook or belittle the aid of the hands in

expression. I have watched Duse with feelings of mingled admiration and hopelessness in many plays. Her art as expressed by her hands is indescribable."

Speaking of sculpture Mr. French said: "I doubt if in sculptural art there is anything more expressive than the lost arms and hands of the Venus de Milo and those of the Samothracian 'Winged Victory.' How we would resent their restoration. As it is, we dream those arms and hands into place and to each dreamer is his own interpretation of their beauty.

A Studied Art "Italians are invariably graceful and convincing with their hand gestures. Every movement has its special significance, facile, but never futile.

"Novelli—possibly the greatest character actor in the world at present—said that his study was the street, the hospital, and the shop, or any place where people gathered together. There he studied the hands drawn with pain, the furtive hand movements of the mendicant, the nonchalant gestures of the apple-eating boy, the careless farewell on the street corner.

"Mark Twain had beautiful hands, and often he would stop and complete a sentence with a gesture so convincing that words would have detracted rather than added to his meaning.

"Pantomimists and dancers all study the uses and meaning of the hand and arm. Miss Ruth St. Denis and Miss Mary Garden have a technic of hand movement that is marvelous. Pavlova's hands are like the petals of a flower when she dances and you almost expect to see them float away. The way the dancer Genée holds the edge of her skirts is a revelation, too, in the art of the hand and wrist."

When a successful sculptor lays such stress upon the hand and its expression, the photographer should not be neglectful of its value in the portrayal of personality. Mr. French does but enunciate in other words what I have here to say about observation and study.

Its Value in the Portrait We all know how easily a picture can be spoiled by a badly placed, poorly posed or misshapen hand. Conversely, what a delight to the eye the beautiful hand is when it

is given its appropriate place in the portrait, in its true drawing and proportion and properly subordinated in tone value to the chief interest in the picture. The more the hand is studied and observed, the more beautiful and interesting it becomes.

**Learning to
Appreciate
the Hand**

I subscribe to the assertion that there are no "bad" hands, unless they are crippled or misshapen (as in those afflicted with rheumatism or the like), deformed or maimed. Even these have their pictorial value; they show character. The hands twisted or abnormally shaped by years of hard, physical use are expressive of their use, and need not necessarily be unpleasing if carefully managed in the picture. The average hand, even though it be not beautiful in itself, can be posed satisfactorily; but to do it you must acquire the hand-obsession, and only persistent study, observation, and practice will achieve this. Facility is the translation of knowledge into action, and this results from a nice perception, with diligent and deliberate attention to detail.

Balzac made himself a writer by the blood and agony process. He said himself that he had no gifts, but he surely had a genius for taking infinite pains. Most people who accomplish anything worth while possess this necessary faculty.

When Durer accepted the commission to paint the famous altarpiece of "The Assumption of the Virgin" for the Dominican Church at Frankfort, he wrote his patron, Jacob Heller, that he looked forward to the immense labor involved with ardor and enthusiasm. For two years thereafter he made endless studies of the details for this picture, one of which, "The Praying Hands" is reproduced as the frontispiece to this monograph. It is universally conceded by artists that this "study" is the most masterly interpretation of the human hand which we possess. Note it well and take it as an inspiration in your portraiture.

**Painters'
Hands**

The statement is sometimes made that painters do not paint the hands in their portraits from the hands of their sitters, but use other models possessing hands pleasing

in form and beauty. This will not bear investigation where a portrait is conscientiously executed by an artist of repute. Such a statement is well calculated to foster a feeling of helplessness in the photographer when he sets out to portray the hands of his subjects.

From my fairly wide acquaintance with the methods of the portrait painters of today, I think the statement is misleading and unjust, and that this practice does not obtain except in the portraiture of society ladies or genre work for exhibition. To the contrary, an artist adds character to his portrait by a faithful representation of the hands of the subject, and to introduce the hands of another person would unquestionably bring in falsity and so contribute to the failure of the work as a portrait. This is exactly in line with my contention that the hands are a necessary corollary of the likeness.

The truth would seem to be that the painter gives the same care and skill to the hands as to the face, seeking always to introduce lines and forms of beauty in the treatment of all parts of the figure. If the photographer will follow this rule as patiently and as painstakingly as the painter does, he will as surely obtain a like facility and success.

There are many other things to do with the hands in portraiture besides placing them in the orthodox positions. **Avoid the Commonplace** Frequently the hand may be made to add materially to the beauty of the pose, to add a striking note, or give dignity and character to the figure. The elbow may be placed upon a cushion or the arm of a chair, and the hand, gracefully posed, may rest at the waist, or upon the bust, or near the chin. No one who has observed the Parisian make his adieu to a lady will easily forget the graceful pose of the right hand over the heart which expresses the adieu. Similarly, a lady at her writing table, with the tip of her penholder just touching her lips as she frames her message, gives us the suggestion for a happy pose of hand and arm. There is an infinite variety of these spontaneous touches of grace in the human gesture, which observed and stored in the mind, will often serve to add distinction to a pose otherwise

commonplace and uninteresting. Plate V exhibits some unusual hand poses along the lines here suggested. It will be seen that in many instances the hands vie with the face in interest.

Without doubt a proper attention to the hands and their arrangement not only results in more artistic or more pleasing portraits, but also serves to improve the sitter's expression. It may be that this results from the relief experienced by the sitter from his or her knowledge that the hands (almost always a source of anxiety) are being taken care of; or perhaps it results from taking the sitter's mind away from thoughts of facial expression, by giving him something else to think about. A satisfactory head and bust portrait with the interest solely dependent upon the face, *and necessarily upon an easy and natural expression*, is among the most difficult of the problems the portraitist has to face. Many do not realize this truth, but everyday experience gives it convincing demonstration. A photographer who has devoted himself to the head portrait, hiding the hands, will quickly agree to this proposition after he has mastered the posing of hands as a vital part of the portrait. He will find that in this way a new note has come into his work, a note which adds to the interest and variety of his portraiture and which will give greater satisfaction and pleasure to his patrons.

There is, in fact, no one thing connected with portraiture which will so beautify and adorn the portrait of a man, woman, or child, as a well placed or beautifully posed hand. And, of course, by hand I mean the arm as well, for the lines of the arm and its easy grace of disposition, all lead to a termination in the hand; and it is obvious that one member must complement the other. Concerning their intimate relation, the reader will find a profitable paragraph elsewhere.

I am a strong advocate of never—or hardly ever—hiding the hands in making a portrait. Of course, there are poses where the hands naturally disappear from view, but they are rare. And always the hands should be properly

subordinated in interest to the face. But their value as adding character and interest, if not charm and beauty, to the portrait is undeniable and should have recognition. The persistent hiding of the hands, as we see this in a majority of the portraits of our day, is always an outspoken confession that the photographer did not know what to do with them.

**Practise Acute
Observation
Everywhere**

To the photographer who is in this predicament, I recommend an intensive course in acute observation of the hands in relation to and as part of the figure.

This can be begun and practised anywhere, everywhere, at all times and places, wherever people congregate or in solitude before a mirror. My favorite places for this study are the street cars and the railroad depot waiting rooms. There you may observe all sorts and conditions of people, quite unconscious that you are making them your models. There you will find hands in every conceivable pose and arrangement, expressing in action or repose every human emotion and mood, revealing every shade of character. And in every pose you can observe grace or awkwardness, beauty or ugliness. If you are unable to recognize these differences instinctively, realize that you have in this lack of perception a big obstacle to overcome before you can hope for success as a portraitist. But realize, too, that patience and perseverance will work wonders.

Begin to interest yourself in the hands as expressing something, and as terminations of the figure lines. Presently you will learn to see, and when you see, you are profiting. Every person you observe, every picture, every statue, has its lesson and will tell you something worth knowing about the treatment of the hand in portraiture, if you will but grasp the opportunity and get the lesson set before you.

**Knowledge
is Power**

The pleasures of portraiture are enormously enhanced by the knowledge of what to do with the hands which comes from this observation. The self-consciousness of the sitter as to his or her hands is the most familiar stumbling-block in portraiture, and the question, "What must I do with my hands?" the most familiar

of the questions put to the photographer. If the photographer can answer, "Leave them to me," there comes to sitter and photographer alike a feeling of confidence and mastery which spells success in the portrait. It is indeed a pleasure to have a lady say to you, "I have the utmost confidence that you will give me beautiful hands, for you have done it for me before."

**The Education
of the Eye**

To reach this proficiency and gain that reputation among one's clientele which makes them confidently acquiescent to every suggestion, one must study, study, and then study more, with unceasing observation, until the habit of seeing the significance of lines and details without conscious effort becomes second nature. Every artist worthy of the name has reached this point in the education of the eye, and there is no reason whatever, except carelessness and sloth (or an entire lack of vocation), why the portrait photographer should not possess this ability to see, which means so much in the interpretation of his subject. If this ability cannot be acquired, it would in truth be wiser to give up the making of portraits and turn to some other branch of photography.

**The Moving
Picture Show**

The photographer who does not avail himself of the opportunities for the study and observation of figure poses, the hands in action and repose, and variety of lighting effects offered by the moving picture shows, is missing more than he realizes. I know of no more profitable field for the observation of the hands and their treatment. Many wonderful lessons may be learned in this field, apart from the training in acute observation which it gives. Of course, the photographer should concentrate his attention upon the hands as the figures come and go upon the screen. The advantage of this special field lies in the fact that "movie" players are, of necessity, fully alive to the use of the hands as a medium of expression. You will note that some players instinctively use their hands in a graceful way, displaying an endless variety of beautiful arrangements and poses, while others are not so careful or less skilful. Necessarily the hand poses seen on the screen, being part of the movement of the figures in action, are unconscious

poses, which adds to their merit. I have often been greatly impressed by the marvelously beautiful hands possessed by the women principals of the "movie" world, and the cleverness displayed in their use of the hands to express the sentiment of the moment and assist in the portrayal of character. I commend this interesting field of study and observation to the reader as worthy of intensive cultivation.

**Mirror
Study**

One of the most instructive and successful methods of studying hand posing, and gaining familiarity with the almost infinite variety of hand and finger movements, is to use yourself as a model in front of a mirror. The mirror should be placed so that a side and somewhat top light falls upon yourself and especially upon your hands. All the most desirable arrangements of clasped hands, crossed hands, interlaced fingers and individual hand poses, you can make for yourself at the mirror and so study them in odd moments of leisure. If you go about this work seriously, you will find that your faculties of observation and "seeing" will be vastly strengthened. You can learn more in an hour of this mirror practice than you will gain in a long period of routine work in figure posing under the skylight.

**How to
Practise It**

Let us take an example of this practice. Place your hand upon your breast. Fold the fingers to the second joint—not too tightly. Arch the wrist and then straighten it. Note the change of lines with each movement. Release the fingers one after the other, giving some more free play than others. Observe how quickly the whole hand changes its outline for better or worse. Now roll the hand inward, exposing less of the back. See how it gains in length. Arch the wrist, extend the middle fingers, the second or longer finger more than its fellow. Now raise the first or index finger by bending both joints very slightly. You have by these changes tapered the hand in pleasing fashion. Be careful to see that the little finger follows the third, but curves a trifle more inward—hardly enough to lose the first joint. With this you should secure a good hand.

In this exercise, note how the fingers can be tapered

by the slightest overlapping near their ends, and also that the perspective of the lens (more decided as focal lengths decrease) will taper the fingers if the ends are ever so slightly bent inward or placed away from the camera as to their direction. Study the disposition of hands in Fig. 7, Plate V.

**How to Win
Proficiency**

The photographer who sets out to master the posing of hands should always bear in mind that, no matter what the pose of the figure may be, sitting, standing, reclining, or in action, with the hands in repose, holding anything or occupied, the same fundamental principles apply in each case. These principles are clearly and fully set forth at one place or another in this monograph, with an abundance of reference to examples in which the principles, or the faults resulting from their non-observance, are illustrated. To the writer, who has accustomed himself to acute observation in this field these many years, the placing of the hands in a pleasing or beautiful pose, so that they adorn instead of disfigure the portrait, seems absurdly easy; but this facility has been acquired only by long and patient study and observation, supplemented by a knowledge of drawing and art. But there is no reason whatever why any photographer who wishes to become skilled in this essential part of portraiture cannot acquire at least the ability to give the hands of his sitters the graceful poses which will win the praise of his patrons, and at the same time add distinction to his work.

**A Practical
Knowledge
of Drawing**

Apart from the study and observation of the hands in the everyday life around him and in the works of painters and sculptors, a practical knowledge of drawing will be of the greatest value to the photographer, as giving him the sense of line and form in composition which is essential to success in the arrangement or posing of the hands in a portrait.

It is not intended by this to suggest that the photographer must master the art of drawing the figure with pencil or brush; but simply that he should have such a knowledge of drawing as will enable him to produce in his work good and pleasing lines, and especially a

knowledge of the importance of the terminations of lines in figure composition. Such a knowledge may be gained by the study of such elementary handbooks as Vanderpool's "The Human Figure" and Lutz's "Practical Drawing," accompanied, of course, by actual practice with charcoal and a plentiful supply of cheap, manila drawing paper. Obviously a winter evening course in figure drawing at the local art school, with particular reference to the drawing of arms and hands, would give a broader and deeper understanding of the many problems involved.

I suggest that the reader go to the **Systematic Study of Pictures** Print Department of any large public library, art gallery or museum, or obtain for himself and carefully study the work of the artists listed below. For facility of reference in identifying their works, I have appended to the name of each artist a few of the titles, which will enable anyone easily to find these examples of skillfully and beautifully posed hands. Many small but satisfactory reproductions of the pictures named may be found in the "Master in Art" and "Painters" series, or in the collections of Perry and Soule Prints, and the illustrated catalogues of American and foreign art galleries which may be picked up at second-hand for a nominal sum. The wise photographer will make up a portfolio of such prints for his inspiration and study.

GILBERT STUART: Miss Nancy Penington; Marchioness de Casa Yrujo. (Both of the above show decided "lines of beauty" and perfect terminations.)

VIGEE LE BRUN: Portrait of Hubert Robert; Portrait of self and daughter; Another self portrait; Marquise de Jaucourt; Marie Antoinette; Peace Bringing Plenty.

WILLIAM BOUGUEREAU: Songs of Spring; Brother and Sister; The Shepherdess; Cupid Lying in Wait; The Madonna with Angels; Holy Women at the Tomb of Christ; Girl with Cherries; Innocence; The Virgin of Consolation.

JEAN INGRES: La Source; Madame Destouche (drawing); The Stamaty Family (drawing), a wonderful study group; The Vow of Louis XIII.

JULES BRETON: The Song of the Lark; The Sifter

of Colza; The End of the Day; The Gleaner; The Shepherd's Star; The Breton Woman; Return of the Gleaners.

ALBERT MOORE: Battledore and Shuttlecock; Midsummer; Pomegranates; The Wardrobe; A Musician; Seagulls; Shells; Summer Night.

MAURICE LA TOUR: Marie Leczinska (Queen of France); Madame de Pompadour; (The head portraits of La Tour are also worth faithful study).

GEORGE ROMNEY: Emma, Lady Hamilton (with hat); Mrs. Carwardine and Child; Portrait of Mrs. Mark Currie; The Stafford Children Dancing; Lady Hamilton (with dog); Portrait of Lady Pulett; Elizabeth, Countess of Derby; Margaret, Countess of Carlisle; Mrs. Minguay; Mrs. Grove; Miss Benedetta Ramus; and others.

It would be easy to extend this list a hundredfold. The works of the English masters, such as Alma-Tadema, Burne-Jones, Rossetti, Leighton and Watts.

For variety and exquisite refinement in finger movements I especially commend Rossetti's "Day Dream," "Astarte Syriaca," Alma-Tadema's classical Greek subjects: "The Vintage Festival," "Sappho," and others. Strudwick's "Gentle Music of a Bygone Day" is full of inspiration. These masters were marvelous draughtsmen and their treatment and delineation of hands is a positive joy and satisfaction. Profitable lessons in lines and their termination can also be learned from the works of those painters who have devoted themselves almost entirely to the draped figure. In this sort of study the photographer will perceive why the painter and sculptor have given so much labor and study to the hand, since it will be obvious that carelessness or neglect of this would have ruined their work.

Among the paintings of Jean Baptiste Greuze which will aid the photographer in gaining facility in posing the hands are his "Milkmaid," "The Broken Pitcher," "Friendship" (a group), "Head of Girl," and "The Winder." This artist was much given to poses showing the flat portions of the hand—positions that are generally difficult and unsuccessful with the camera. The "line

of beauty" is very apparent in all his compositions. The works of Lawrence, Gainsborough, Watteau, Boucher and others of their period offer many profitable opportunities for observation and study. I have indicated only a few of the pictures which have helped me in composition, the arrangement of lines and forms and general treatment of the hands. The citations are wholly of portraits of women, but men naturally follow where the photographer succeeds with the gentler sex, and the same methods prevail to a very great extent in the proper treatment of the hand with both men and women. Every example cited will show the line of the arm and hand continued to the joints or tips of the fingers, and never broken or suddenly deflected at the knuckles—a fault always to be avoided.

**The Value
of Suggestion** I repeat that the study of pictures will be a constant inspiration and help in your work. The sight of a well-posed figure in which the hands are interesting, or offer a pretty arrangement, will always suggest something directly helpful in your treatment of your sitters. One good pose suggests another.

For example: Hands that are doing something seldom need to be ugly or awkward. I never pose a person holding a book that a famous picture with the same motive does not become envisaged. An effort to reproduce a famous picture may be beneficial and instructive. It cannot be done, of course, but the attempt and the failure may bring profitable lessons, making it worth while. We learn much by our failures. All one can do in this imitation or copying is to reproduce an idea. The slavish copying of costume or accessories is simply foolishness. As every worker in the profession knows, given the same model with the same gown and surroundings, no absolute reproduction of a previous effort can be accomplished. Hence the futility of trying to duplicate a masterpiece by another hand. Yet I say that the effort may be profitable. It teaches, and the things one does oneself are an abiding source of instruction. For my own part, I have studied and lived with pictures for so many years, here and abroad, that every pose I essay finds a model envisaged in my mind. In these

studies, therefore, there is a wellspring of inspiration always helping things along. This treasury of help and encouragement is open to anyone who will study and observe, winning knowledge by diligent application and experience.

**Do not Pose
All Hands**

Bear this in mind: There are thousands of instances where the hands do not need posing. These you must be able to recognize instantaneously by the grace and charm exhibited, and seize upon them successfully. Other hands may lack grace or be held awkwardly. There are many examples of this in Plates VI, VII, and VIII, where the hands might have been made more attractive or more interesting by knowledge and experience if the photographer had these at his fingers' ends. To study the treatment of the hands in portraiture does not mean that every hand in every picture must be posed or deliberately arranged. Far from it. But it will teach you to recognize where this should be attempted and where it is not needed. There are few of us who cannot learn something of advantage every day. I get new ideas from old ones by suggestion, and this adoption, exchange and adaptation of ideas should be a continuous process with the portraitist who desires to advance in his profession.

**All or
Not at All**

Either let the hands disappear entirely or show them fully and gracefully. I have seen portraits in which only the top of the hand was visible, the rest being concealed by drapery. The result gave the impression of deformity which should be religiously avoided. The same is true of letting the drapery or gown obscure the upper or lower line of the forearm. If this parallels another line the result is a wooden or sticklike effect (see Fig. 1, Plate VIII). The taper of the wrist and the round forearm of a woman is one of the most attractive things that may be shown in a portrait, and much, not little, should be made of it. If the drapery is allowed to interfere with the lines of arm or hand, as in Fig. 5, Plate VII, the picture may be ruined to the observant eye. The photographer should cultivate this critical observation which artists include under the "education of the eye."

How the Masters Work A careful study of the great masters in portraiture in any medium will reveal the fact that they all, without exception, follow the same methods and observe the same rules in their treatment of the hands. The same arrangements are to be found repeated everywhere. If there is such unanimity of practice among painters and sculptors in the treatment of the hands, why should not the observant, would-be artist-photographer follow the same methods with advantage? I have proved the reasonableness of this in my practice, always endeavoring to embody the ideas of the masters in my portraiture, and my purpose herein is to point out some of the lessons and ideas which may profitably be assimilated by a studious observation of these master methods and their application in photographic portraiture.

Concealing the Art It has been truly said in all ages that art consists in concealing the art. That is, when a thing is carefully and skillfully done, it fails to look studied or labored. Reaching a result laboriously, painstakingly, and with careful consideration and thought need not produce a work which reveals to the onlooker the way by which the result was achieved. All good work, in art as elsewhere, is generally the product of observation, study, and skill. Yet there should be no evidence of this other than the perfection of the work. In dealing with the hands in portraiture, this can be accomplished if careful consideration is given to the lines of grace, and the arrangement is so managed that the pose calls forth only admiration and satisfaction.

A Difference of Viewpoint Sometimes the sitters must be told that their own view of their hands is quite a different view from that seen by the camera. In physical fact it is a viewpoint 90° from that of the camera. When this fact is pointed out, sitters are usually much more willing to have their hands posed or to fall in with an arrangement which may seem to them—and, from their viewpoint may be—an awkward and unnatural position.

Another thing the photographer has to contend with is the fact that the camera sees with but one eye. The

photographer, viewing his subject with two eyes, sees a plasticity of form in the hands which cannot be realized in the photograph. I have wondered how many failures can be attributed to this vital difference of vision. Few people seem to have thought of it, and it is never mentioned in the numerous papers on the hand in portraiture which have appeared in the photographic papers during the past ten years.

**Look on the
Ground Glass** One result of this difference of viewpoint is that a thoroughly pleasing composition of the hands can only be made on the ground glass, for only in this method can the drawing of the hands in any proposed arrangement be faithfully observed. By drawing, of course, I mean the composition, which is necessarily made up of the lines and their terminations and the masses of light and shade.

The unaided eye is frequently deceived, and does not take into account the distortion and disproportion of parts produced by the perspective, which is directly related to the focal length of the lens used. These things, and the differences of form and effect in the different views of the lens and the eyes, are unfailingly revealed on the ground glass. Hence I urge the reader, if he aspires to anything like perfection in composing his portraits, to study his subject on the ground glass. When years of experience have taught the eye to see, as it were, in one plane, then and then only can a pose be made without constant reference to the picture image on the focusing screen. And even then it is unwise to neglect what the screen will tell of the view given by the lens. The screen should be the final arbiter. This is vital for good hand posing. Little things, unseen or unnoticed by the eye, are there revealed with magical distinctness, and it is the sum of little things which makes or mars the whole work. As Michael Angelo is said to have remarked to a pupil: "Trifles make perfection; and perfection is no trifle."

**Size and
Proportion** Do not be dismayed by large hands. Proportion makes for beauty more than mere size. There are hands wearing the largest gloves made, quite as beautiful as those clothed in the "perfect 5." Without some other object whose

size and proportions are already familiar to the eye, a large and well-proportioned person cannot be distinguished, in a photograph or at a distance, from a smaller person whose proportions are equally good. So it is with the hand. If the sitter is well proportioned throughout, a large hand or foot can be posed so as to appear altogether pleasing to the eye. It is the sitter whose hands are disproportionately large that gives trouble. Keep the hands in or as near to the plane of the face as is possible without awkwardness or distortion of pose. Thus, if one hand be placed slightly in advance of the face plane, and the other at some little distance behind the face, they will appear so widely different in size as to make one question whether they belong to the same person. Great care should be exercised in this regard, especially when it is necessary to use a lens of short focal length. By keeping the hands somewhat near each other or in the same plane this defect is easily avoided. Even when this variation of size is scarcely noticeable to the eye, a reference to the picture image on the ground glass will reveal it at once, as the lens exaggerates the perspective.

**The Eye
and the Lens**

The fact that the eye is a very small lens, giving perfect perspective, should never be lost sight of. Few lenses have ever been introduced for portrait work that will give the same drawing and perspective of the subject as that seen by the eye, and the photographer should be on his guard to avoid the unpleasant distortion which results from the use of a lens of too short focal length. This applies generally in all figure portraiture, but with special force to pictures where the hands are included in the composition. Study this point of focal length.

**The Hands as
Terminations
of Lines**

The hands are nearly always the terminations of lines, and, as a natural result, play an important part in the grace of the lines they terminate. Even if the hand itself is well arranged, the lines connecting with it, or the lines flowing to it, must produce a feeling of ease and grace essential to a pleasing pose. Bear in mind that the arm line can be felt even though the line itself be unseen. It may be covered wholly or in part

by drapery, or hidden by another arm (as in a group), yet the line is there, and unless carried through gracefully and naturally, will disturb the eye of anyone with cultivated taste. Again, these lines must finish easily and gracefully, or the eye will experience an unpleasant jar as it runs along the line of the arm. This is shown unpleasantly in Fig. 6, Plate VII. As far as is possible these lines should be managed that they show the line of beauty, i. e. the return curve, and the beauty of a picture is largely dependent upon the repetition of this line as often as possible. The endings must finish the curve, and there may be many endings—all correlated—in the fingers. This is shown in Fig. 8, Plate V, where the lines are all curving and all flowing together.

Remember that the fingers should
Vary the Finger Lines seldom duplicate or exactly repeat lines. Slight variations in their arrangement are always necessary.

Properly considered, the stopping of
Avoid Abrupt Terminations a line is as serious a matter as the introduction of the line itself. A line *may not* begin anywhere, lead anywhere, and end abruptly where it will. It should be like a *smorzando* in music—a gradual effacement or dying away—fading into obscurity; otherwise it is aggressive, annoying and so disturbing. These things are perceived even by the uneducated or uncultured eye, but such observers know only that something is wrong and cannot put their finger on the trouble. Generally they simply don't like it and let it go at that.

The artist-photographer must see and arrange for the production of these effects, without seeming to strive too obviously for them. In other words, practice, observation—acute observation—will and must make him so sensitive to lines and their terminations that the desired effects will be secured without laborious effort on his part and, of course, without his sitter's knowledge.

The first step in this achievement of
Let the Hands Relax the line in hand posing is to persuade the sitter to relax as far as the hands are concerned. Ask the sitter, if mere suggestion is insufficient, to let the hands lie inert, without tension, in any

position in which you may place them. When this responsiveness is obtained, you can generally do what you will. The average sitter is unfortunately antagonistic in this matter rather than responsive; if you essay to move a finger, the sitter will stiffly resist or move the whole hand in a mistaken idea that he is helping you. Sometimes a sitter will turn the hand unbidden—an expression of nervousness—and ruin your arrangement. But if you have learned the significance of lines as terminations, you will correct this with little trouble.

While it is good to use the fingers to finish a graceful line, the hand may often be so posed as to indicate the fingers without showing all of them. This you can readily see by mirror practice with your own hand. It is a detail which is always given careful attention by portrait painters, but glaringly neglected by photographers. Beware, especially, of making one or more of the fingers disappear abruptly, which always suggests malformation or a lost member, as shown in Fig. 3, Plate VIII.

Avoid the "Fist" In how many portraits do we find the pugnacious fist in place of the hand! It is fatal to produce a "fist" unless a fist is wanted. Try putting your hand on your chest; pose it gracefully before a mirror; turn your body and watch the reflection of the changes of the form of the hand as the body is turned. If you turn so that more of the back of the hand comes into view, the fingers begin to disappear, and you will see deformity appear unless the fingers are so disposed as to terminate the arm or wrist lines gracefully. The pose of the hand on a book is another illustration. Put it at the far side of the book, or underneath, so that it is in view. If the visible portion of the hand is gracefully outlined, the other parts will be there correctly by suggestion; but if what is shown indicates awkwardness, the hand pose is a failure. See the paragraph on Mirror Practice on page 147 and Plates IV and V.

Sometimes the malformation of the hand by this careless disposition of the fingers is the result of poor lighting. The remedy is to see that the hand receives sufficient light to indicate the outline of its parts.

**Relation of
Hand and Arm**

A careful study of several hundreds of portraits—many of them made by leaders in the profession—shows that few photographers are aware of the intimate relation of the taper of the wrist and forearm to beauty of pose in the hand. This relation becomes obvious when once pointed out. You can demonstrate it for yourself with a model, or by observing the movements and changes of form with your own hand and a mirror. The best view of the arm almost always carries with it a pleasing position of the hand. Conversely, if you pose the hand gracefully, you will find that you have a pleasing form and direction in the forearm. This is important in portraits of women, where the bare arm is often shown and its treatment invariably enhances or detracts from the artistic effect in the portrait.

**Correlation
of Lines**

The arm tapers to the wrist. In one view, however, the lines are nearly parallel for some little distance. Observe: when you get the tapering wrist and forearm lines, you get a good hand which needs little in the way of arrangement to make it beautiful. Conversely: when you get the parallel lines the pose of the hand is rarely pleasing. Bending the wrist more or less will increase the beauty of the curves. When the hand is turned so that the wrist bends easily, you will get the desirable, tapering wrist lines from the viewpoint of the lens. Note how the good movements of wrist and forearm fall together in correlation, and help to make good poses of the hands a simple matter. Similarly, a slight side bend in the wrist in almost any pose of the hand will give more graceful lines. These points may be studied in Fig. 3, Plate VIII, and the destructive parallel in Fig. 3, Plate VII and Fig. 2, Plate VI.

**Carrying the
Lines to Proper
Terminations**

There are few exceptions to the rule that the upper line of the arm and hand, beginning at the elbow, should never be permitted to end abruptly at the knuckles, but should be continued to the second joint or to the ends of the fingers. It is best to turn the hand enough to make this line continue by the first finger, but there may be a reason for letting

some other finger be the termination. The bad effect of stopping the line at the knuckles can readily be seen in Fig. 3, Plate VIII, and the more graceful result produced by continuing it beyond the knuckles may be perceived in many of the other illustrations. By closing the hand so that the lines are abruptly changed at the knuckles, a decided jolt is given to the eyes, and it invariably disturbs the grace of the ensemble, producing an awkward and sometimes distressingly ugly hand. Carrying the line to the second joint of the finger or beyond will give grace to the hand in almost any position. When so continued the line should be ended at an obtuse angle—never at a right angle. This holds good almost without exception, as may be seen by consulting the works of masters in painting and sculpture. The lines are always carried to the second joint or to the finger tip, so that when the hands are joined the lines flow gracefully from one hand into the other, or are pleasingly terminated by the object held in the hands. See Fig. 1, Plate V.

The Fore-shortened Pose Placing the hand and arm in a fore-shortened pose (i. e. end on) is a delicate and somewhat dangerous thing to do, owing to the lack of stereoscopic relief in the image given by the single eye of the camera, and the inability of the lens to give a correct rendering of this effect. This will serve to emphasize the advice given elsewhere to make the ground glass the final arbiter as to the drawing of the pose before the exposure is made. Effects that you see with both eyes as you view the sitter will often be found lacking on the plate. This is one reason why so many poses, which seem very promising as seen under the skylight, are disappointing in the negative. The portraitist who imagines that he "does not need to look on the focusing screen" is laboring under a delusion and his work will betray him.

How to Avoid Flat Hands Whenever it can be avoided, do not pose the hand with the flat palm or back towards the camera. For examples of the evil effects of this see Plates VI and VII. There are, of course, exceptions to this rule, but they are rare. It is generally possible and advisable to turn the hand

slightly one way or another. If it should seem necessary to show the full back or palm of the hand, bend the wrist rather smartly either in or out, as in Fig. 2, Plate V. See which movement gives the most pleasing result, and watch that the fingers do not exactly repeat each other in line or action.

**The Back of
the Hand**

When much of the back of the hand is shown, keep the middle fingers together, and spread the first and last fingers, bending them slightly. Do not bend both of them so that they produce the same curve. In putting the middle fingers together, the best usage is to let one finger-tip overlap the other very slightly. This gives a tapering effect to both fingers. See "Motherhood" and "Arise," in Plate III.

**Value of the
Accidental
Note**

In hand posing it is the little accidental note that counts. A pretty bend of a finger; an upward lift of the wrist; the drawing together of two fingers while the others are spread slightly apart; fingers following each other in line, but not repeating the action exactly, the tapering outlines flowing from a common center like the petals of a flower; all these and others which will be revealed by study and observation are the little details upon which grace and beauty depend.

**The Mobility
of the Wrist**

The beauty of a well formed and attractively displayed hand is a positive delight. The numberless changes which can be rung upon its note of charm can only be appreciated by pondering upon the infinite variety of its beauty. The wrist is a ball joint, and an almost unlimited number of movements are possible with it. Its pliability and mobility are amazing. One difficulty is that the possessor of a pretty hand seldom knows it, and when he or she does know, they seldom appreciate its potency of charm and grace when used properly. Unconscious grace in the use of the hands is a great desideratum, but few attain it, and especially the sitter before the camera is apt to be transfixed with self-consciousness in every part, and then, alas, grace takes wings. An attempt to move a hand or arm, or even a finger, is unconsciously resisted, sometimes to such an

extent that these members seem to be actuated by steel springs.

With such subjects you must first aim for complete relaxation and mobility. This secured, the changes that take place are surprising. Graceful lines appear of their own accord as the natural result of movement. A turn here and a touch there, and beauty stands revealed where before only awkwardness and rigidity were apparent. Strive for variety of effect.

Expression at the Elbow In posing a sitting subject with the hand resting on its side on a sofa or similar support, always make it a point to have the arm relaxed so that the elbow will fall in toward the body. Any stiffness or tension of the arm muscles in such a pose gives rigidity and will show plainly in the finished portrait. Apart from this, an outward curve of the arm is generally undesirable. It should sweep inward, be it ever so slightly, and rarely if ever outward. The inward curve gives grace, the outward bend produces awkwardness.

The various parts of the body are all expressive and all correlated in movement. Repose in a picture cannot be secured unless every part of the body gives its assistance. Sometimes, however, the sitter may feel at ease, and yet the lines of the figure may belie that feeling; and oftentimes a pose that is rather difficult to hold will give grace and ease in its lines. This is especially true in the treatment of the hands in a portrait. At times the sitter will place his or her hands, and may be somewhat insistent on this self-arrangement, on the score that their hands look right to them. In such a case it may be necessary to point out that the lens sees their hands and general pose from a very different viewpoint, and they are incapable of judging for themselves in this.

The Hands in Occupation It does not follow that because the hands are occupied, as holding a book, playing a piano or other musical instrument, or engaged in any necessary use, that the pose must be ungraceful. Even with the violin bow hand, which I have found to be the most difficult hand in occupation, it is generally possible to find a pose somewhat removed from the stiff parallels given by the

fingers which most violinists think is *de rigueur*. As suggested elsewhere, the bow should be moved up and down in easy motion until a semblance of grace is found. There is no excuse for the awkward hand in any form of portraiture. If you will give the hands the study they demand, in paintings, sculpture, in the street cars or at the picture shows, you will learn to recognize the forms of grace and beauty and how they are produced. The photographer, by this method and assiduous practice, has acquired this cultivated taste in the handling of light and shade, and their effects in modeling the features of his sitters. It is only a step beyond this to acquire that cultivated taste, and that unconscious recognition of the beautiful in line and form, which will give you the facility to secure pleasing and graceful poses of the hands. The most important part of this ability depends upon your realization of the significance of lines *and their terminations* as seen in every good pose or arrangement of the hands. This appreciation of the termination of lines is of vital importance.

When the hands are at work, doing or holding something, it is not always possible to represent them at their best, but with care much can be done to avoid bad angles, misshapen forms and unhappy lines.

The principal difficulties encountered in dealing with the hands in occupation arise from the stiff fingers, the abrupt angles, or the squared knuckles of the closed or almost closed hand. Sometimes a side bend in the wrist will give relief from the appearance of stiffness, as in the right hand in Fig. 2, Plate V. Although here it was necessary to show the palm, and the parallel wrist lines which generally produce stiffness of effect, the outward throw of the wrist introduced a suggestion of grace, and changed the otherwise bad line of the thumb side of the hand into a decided curve, which terminated the perpendicular with a sense of the line of beauty.

Conversely Fig. 4, Plate VIII shows exactly how not to hold a pendant object. Stand at a mirror and take this pose; then observe how easily the square can be made to change into a graceful hand by slightly turning the wrist and hand.

**A Violinist's
Hands**

In posing a person with a violin, the fingers of the bow hand will present a formidable difficulty. The technique of violin playing seems to require four straight, stiff fingers for the correct position—than which nothing could be more unlovely from the photographer's viewpoint. The best way to minimize this difficulty is to ask the violinist to play a few bars and carefully to watch the hand as the bow moves up and down. Some point in this double movement will be found where the hand and arm have at least a semblance of grace on which to base the pose. Also watch the left hand as the fingers are moved in stopping down the strings. Numberless beautiful poses of the fingers and hand, wrist and arm may be observed in this way and the selection of a pleasing pose made without difficulty. In this observation it will be seen that a lifting, arching and even a backward bending of the wrist will often increase the charm of the lines of the hand and their terminations.

A course of experiment before a mirror, using your hand on a ruler or anything approximating the neck of a violin in shape and bulk, will demonstrate the truth and force of what has been said on these points.

**The Large
Hand**

Many ladies have very large but shapely hands. These may easily be kept down or reduced in apparent size in the portrait by the following methods.

Make a half-length pose sitting, inclining the body well forward so as to bring the face nearer the camera than the hands. By posing the hands behind the plane of the face, as when the subject sits upon a couch, with a pillow behind the head for the hand to rest upon or against. In this arrangement, the hand nearest the camera may be employed by a book and turned, or covered in part by throwing it in shadow to reduce its apparent size. By a standing pose with the hands behind but still showing, the figure being turned sufficiently to keep them behind the plane of the face. Other poses of this sort will suggest themselves wherein the hands may be kept in a plane behind that of the face, as when they are gracefully intertwined over the head, or well

back on the neck and shoulder. It is inviting difficulties to put them in the foreground, as seen in Fig. 1, Plate VII, or Figs. 1, 3, 4 and 7, Plate VI.

Using Different Planes Always bear in mind, however, that placing one hand well behind the face plane and leaving the other in front, will give a violent contrast in the size of each. This should be avoided as contributing a grotesque effect to the portrait. In an extreme case, the nearer hand may be subdued in tone in such a way as to suggest itself though unseen. But be careful that in doing this the device is not made obvious.

A Successful Pose A very successful pose for the three-quarter or full-length figure is to put the hands against the wall or background, at a little distance from the body at each side, or, if convenient and agreeable in effect, to let one hand rest upon something not too high. The hand in the rear plane must show its back, but by bending the wrist out and having the finger tips only touching the wall or background, each finger at a slightly different angle and bend, a very attractive hand will result. The other, nearer, hand may be turned to show the thinnest lines of the wrist, and so a pleasing arrangement of both hands, decidedly smaller than in life, may be obtained.

Relative Size: Hands and Figure It should not be forgotten that in full-length figure portraits the hands have a truer size relation than in portraits showing only a part of the figure. This is due to the fact that the camera is farther away from the figure, giving less convergent perspective in lines and, automatically, more correct drawing to the figure and its parts.

The Gloved Hand The gloved hand presents insuperable difficulties in photographic portraiture, the glove covering up the beauty of the hand's anatomical structure and modeling, and giving it stiffness—a wooden quality destructive of its pictorial interest. In my practice I almost always insist upon the removal of the glove in order to give the hands a chance. If the sitters must show that they have gloves, they may be introduced somewhere; in the portrait of a lady

or gentleman costumed for horseback riding, they may be held in the hand; in an indoor portrait, they may be thrown upon a nearby table, chair or window-sill, where these accessories are employed. But it is a good rule to taboo the glove, and make the hand an interest feature in your picture. Where a figure picture of a lady drawing on or buttoning a glove is being made for advertising purposes, the pictorial interest of the pose will, of course, depend upon the skill with which the arms and finger movements are managed. The successful handling of such a figure picture will test all the photographer's artistry.

The reason for removing the glove wherever this is possible, as has been said, is because the glove, however fine and well fitted, robs the hand of its modeling and character, giving it a certain rounded, swollen appearance which is altogether undesirable. Fortunately there is seldom any real necessity for retaining the glove. Even in bridal portraits, the bride will look easier and better with ungloved hands. Of course, they are *de rigueur* during the marriage ceremony itself, but the portrait does not often picture the actual ceremony. If the lady is gowned for the street, or calling, the gloves may be held easily and gracefully in the hands.

Where one hand is "featured," so to speak, or made more prominent than its fellow, see that the second hand is properly subordinated, so that it does not call for too much attention or distract the eye in form and tone values. It should, of course, be gracefully placed, and its lines and the amount of light it receives should have careful attention, but there must be no division of interest resulting from making it too obvious or insistent. This is simply the rule of subordination of interest which applies in all picture making. As soon as every part of a composition becomes of equal interest or value, the picture approaches complete failure. The central idea must be paramount in interest, with everything else in its place properly subordinated. This unity of concentration and subordination of interest is what gives the portrait its chief charm as a composition.

It is said that the best dressed people are those

whose apparel least attracts attention. A good picture should possess the same quality; unobtrusiveness of detail by the subordination of parts to the chief interest, so that the eye seeing it will at once telegraph to the brain "how lovely."

If the hands are placed together on the lap or on a table, the same care and attention should be given to each. This is quite different from featuring one hand—as when it occupies a central or prominent position. See Figs. 6 and 7, Plate VI. These examples would be improved by leaving the hands out altogether.

One thing is never to be overlooked. Do not place a different object in each hand. It is best to leave one hand quite unemployed as in Fig. 1, Plate V. Obviously when an object, such as a flower, is held by both hands, both are employed and taste and judgment must be used to secure good lines and a harmonious arrangement. See Figs. 2 and 3, Plate V. Try to treat each subject differently and do not repeat the lines and arrangement of one hand in the other. There are many little curves and "accidentals" which may be used to secure variety and beauty. Some of these pretty finger movements, easily obtained with the camera, are shown in the illustrations of Plate V and will repay the reader's careful observation. Almost every arrangement in this Plate will suggest a pose or happy combination of hands to those who can apply what is set forth.

Thick, pudgy hands may be made to appear longer and more shapely in form by placing—say the left hand, when the body is turned a little to the right,—on a flexible book, the fold of which drops a little in the lap or between the knees of the sitter. Place the hand over the middle of the book, turn it until the narrowest lines of the wrist appear. Then extend the second and third fingers full length, keeping the middle finger only half exposed and the third finger only slightly overlapping the second finger. The forefinger should be bent sharply at the second joint, and the little finger gracefully extended. The thumb should be kept entirely out of sight. By this arrangement you will obtain a hand which will apparently be slim and tapering.

Helping a
"Pudgy" Hand

**Crossed
Hands**

Many interesting and attractive hand poses can be obtained by crossing the hands—with careful attention to grace of line. The arms may be crossed at the wrist or higher up. Clasping the hands can be done in an infinite variety of ways, but here we must watch for too close and rigid a clasp. These poses can be studied by oneself at a mirror in odd moments of leisure, or by observing the natural poses of the hands of others in these positions as we may find them. Good examples may be found in the works of the painter Bouguereau, who gave the most careful attention to the hands and feet in his pictures. I venture the opinion that no more beautiful examples of perfection in hands and feet and their poses can be found in the whole range of modern art than the works of this artist afford. His drawing is marvelously correct, and his color and execution the very exposition of knowledge of his art. His own portrait, which may be found reproduced in the Bouguereau number of the "Masters in Art" series, should be studied as a good example of the pose of a man's figure and hands. It is photographic to a degree and teaches many lessons in directness, simplicity, skill and perfect ensemble.

**Avoid the
Sprawling
Thumb**

Don't put the hand in a good pose and then let the thumb sprawl or stick out in an unsightly way. The thumb joint is generally the unruly member. The first and second joints also call for careful observation. Frequently, after a good arrangement has been secured, the sitter will relax, and out will go the thumb or, worse still, the second joint will protrude. The sprawling thumb is the most common fault I have found in portraits of men showing the hands.

The only remedy, sometimes, is to turn the hand to get less or no thumb, but the sitter can generally retain the joint in place if you give it a vigorous compression into the right position. The ball of the thumb joint will often be found unduly developed. In such a case a slight cutting away in the negative may be needed and is warranted, just as it is legitimate and often necessary to remove indications of other enlarged joints in retouching. Few hands are perfect in this respect.

**"Armless
Wonders"**

Avoid the perpetration of "armless wonders." In a standing figure a graceful and charming pose may be made with the hands behind the back, but do not do this *ad nauseam*. In the same way it is poor taste to hide the hands behind a pillow, book or other object. Watch people, sitting or standing. When you see an interesting hand pose, or a happy arrangement of the two hands together, try to hold it in your memory and fix it by trying to repeat the pose on the first available model or sitter. If you have no better model, practise the pose yourself at a mirror. You can learn much from this self-posing of the hands before a mirror.

**The Hands
to the Face**

In putting one or both hands to the face, be careful to see that sufficient of the hand is shown to avoid the suspicion of deformity. As a rule the hand should be shown almost completely. When placed alongside the face, the fingers farthest away from the camera should extend upward, but must never be rigid or straight. Let them be relaxed and slightly curved.

Avoid bending the fingers entirely at the knuckle joints. Avoid straightness and stiffness of line and the exact repetition of line and direction. Fig. 4 of Plate VI and Fig. 3 of Plate VIII and Figs. 3 and 5 of Plate VII afford object lessons of the wrong and deformative methods. Fig. 4, Plate V, shows the more graceful arrangement. Never, in any circumstances, let the hand distort the face outlines. One finger touching the cheek lightly in the region of the dimple will often produce an enchanting effect in the portrait of a lady.

Poses of the hands to the face, or interlocked under the chin, are always sure to please the sitter if the hands are prettily or skillfully managed. As a business proposition this is worth consideration. Another advantage of this sort of pose is that it gives secure support to the head, so that time exposures may be given without fear of movement. One of the most charming poses of this kind I have seen was embodied in the portrait of a young girl possessing the most roguish eyes imaginable. This portrait showed a lovely hand loosely placed palm inward to the face, with the fingers opened so that the

laughing eyes peeped through between them. The combination of beauty: face, hand and pose was irresistible.

A Few Simple Rules It is wise to keep the hands as far as possible in the same plane. This avoids disproportion as to comparative size and makes for harmoniousness in effect.

A sharp bend of the wrist will often introduce a more pleasing line, or obviate a suggestion of stiffness, or do away with an awkward angle.

The flat hand is seldom pretty, even in the youngest and most shapely hand.

The fingers must be carefully placed and generally curved. The wrist must be bent—generally outward, and care must be taken not to repeat the finger lines. Turn the hand one way or another, depending on the arm lines; avoid showing the full back or palm. Do not let one finger protrude or stick up when all the others lie in the other direction.

Do not let one hand repeat the other exactly. For instance, in holding flowers or other objects across the figure in a standing pose, one hand should be turned differently from the other. See Fig. 5, Plate V. The repetition of similar lines or forms is a risky matter and, unless skilfully managed, will produce unhappy effects.

In placing the hand upon the hip, keep the thumb down out of sight. Many variations of the hand-on-hip pose are possible and effective. The hand should be rolled slightly inward when the fingers are shown extended. If the hand is folded and rested on the hip, do not bend the hand at the knuckle joint, but rest it on the second joint. This gives more length to the hand and adds shapeliness. Try this at the mirror.

Children's Hands Do not attempt to pose children's hands to any extent. It is better to observe them carefully, and if they are badly placed, wait until they unconsciously take a happier arrangement. Generally children use and place their hands prettily, but not always. Working with children is a severe test of your powers of observation. You must take in everything at a glance, and if the pose and expression are pleasing, make the exposure without tempting fortune further. But if the pose is not

pleasing or the hands are awkward, wait for a favorable and more pleasing pose. Children's hands are rarely still more than a few moments at a time, and a good arrangement will surely present itself. It is fatal to speak to a child about its hands; this resulting in self-consciousness and failure. Often, however, a mere touch of the hand or foot will result in a change which brings the happier pose desired.

The statement that children's hands are always pretty or that they naturally place them gracefully is quite untrue. Note this in some of our illustrations, for example, the bad hand under the chin in Fig. 3 of Plate VII. This child was old enough to take a hand pose given to it by the photographer, and there could be no possible excuse for producing the distorted hand in the example, which represents a seal's flipper more closely than the human hand. This picture, which won an award in a foreign competition, shows that judges as well as photographers need education and training in observation. Not only is the hand a deformity, but the pressure of it upon the face has quite destroyed the contour of the chin and cheek, producing an unpleasant malformation.

The other hand, while not wholly bad, could have been vastly improved by showing the wrist and forearm, simply by pushing down the pillow or drapery upon which the subject is reclining.

Photographers and the Hands In going through a collection of hundreds of prints which have appeared in the photographic journals of the world during the past ten years or more, it is surprising to note how few photographers give due attention to the hands in their portraits. Evidently the hands offer a perplexing problem to the photographer, which he solves by omitting them wherever possible or hiding them by various devices where they cannot be altogether left out of the picture. Where they are included they are rarely handled with any skill, even in the work of acknowledged or reputed masters in the profession. This failure to recognize the value of the hand in portraiture and to master such difficulties as its proper treatment may present is a serious blemish in the portrait work of today, and it is high time that the photographer

give the matter the attention it deserves. If we were to look over a collection of reproductions from figures and portraits done by painters or sculptors, going as far back as Michael Angelo and Raphael, we would discover that the hands have always received the most careful treatment, their importance being recognized as intimately expressive of character and personality.

The Way of Improvement The photographer has not the same freedom as the painter has in his treatment of the figure, but by a careful choice of lenses of proper focal length he may at least ensure correct drawing and proportion in his delineation of the hands of his sitters, and by a skilful disposition or arrangement of them may do much to enable his portraiture to compare favorably with that of the painter. This facility the photographer can acquire, as the painter does, by assiduous observation, study, and experiment.

It has been said that the hand must always occupy the same plane as the face, but there are many exceptions to this notion. It is possible to diminish quite perceptibly the size of the hands by putting them in a plane behind the body or face. Here observation and knowledge, coupled with invention and ingenuity, become very important assets, and the study and practice of these faculties are strongly urged upon the photographer who desires to lift himself above the level of mediocrity indicated by the device of hiding the hands in the portrait.

Returning, then, to the consideration of our collection of photographic reproductions, we find that in many cases a very slight change in the position or turn of the hand would have converted an awkward or uncouth result into a graceful and interesting arrangement. The inevitable conclusion to be drawn from the fact that the hands are largely neglected or badly posed, is that the photographer did not know what to do to improve them, or was so lacking in perception that he did not see the defect in his work.

When one considers that these hundreds of published photographs represent the cream of the output of as many prominent photographic workers, the appalling

ignorance, carelessness, and indifference of the average photographer in this important detail of portraiture become painfully evident.

**Comments
upon the
Illustrations**

I have reproduced, in the illustrations for this monograph, some of the most glaring examples found in this collection of prints. In many cases the originals are the work of men who have achieved an enviable reputation in photography; in other instances the original prints had been awarded prizes in competition with work of the same class. It is not to ridicule these workers that I refrain from publishing the names of those whose work is here reproduced, but simply that by this course I may more freely point out careless and unhappy effects with their appropriate remedies, so that the reader may profit by them. I have endeavored to indicate elsewhere how and where changes and improvements could be made, so that under similar conditions the reader may secure better poses.

I ask the reader's careful study of the two mother and baby pictures shown in Plate III. The beautifully posed hands add a distinct charm in each of these different treatments of an everyday subject. In each case hands poorly arranged but placed as prominently as they are in these compositions would have destroyed the artistic effect absolutely. Yet, when their charm is once pointed out, the added beauty and grace are undeniable. Had they been carelessly or badly placed, they would at once have drawn attention and censure.

In "Motherhood" the left hand is posed exactly according to the usage of all famous painters. Note how the two middle fingers are placed together, the longer finger just obscuring the inner outline of the third finger, thus increasing the apparent length of the hand and the taper of both fingers. This arrangement is easy in photography, and I unconsciously produced almost the same hand when I made the portrait seen in Fig. 7 of Plate V, years before I first saw "Motherhood." Note, again, how cleverly the left hand is disposed; the slight bend of the thumb, the sharp

downward lines of the fingers at the second joint, giving flowing and graceful terminations. These simple devices are easily applied in the photographic portrait and can be used in hundreds of instances presenting themselves within the photographer's year.

In the other picture, "Arise," the mother's left hand is treated in almost the same way as in "Motherhood," yet the pose is altogether different. The two middle fingers are placed together and slightly overlapping each other. There is a greater separation of the first and last fingers, just as we see in "Motherhood." The result is beautiful lines. The little finger is bent inward. This makes the finger taper automatically—another trick very simply managed with the camera. Note how the mother's right hand is made graceful; not one of the fingers follows the same lines, yet they all lead the eye pleasingly back to the upper outline of the hand. The wrist is hidden, but you feel the line of the arm. It is true that both these examples are reproduced from paintings; but there is not a line in them which might not be successfully attempted and as charmingly portrayed with the camera. They serve, also, as suggestive of the profitable study of the work of painters—of which the portraitist should never weary.

In the portrait of Miss Elsie Ferguson, **Plate IV** it will be seen that the hands are held naturally, yet the lines are full of graceful curves. The upward sweep of the arms intensifies the tapering lines of beauty. The fingers properly terminate these lines. Observe how, in her right hand, the finger lines are carried across to the other hand and arm by the book. The under line of her left arm is a perfect return curve—the *line of beauty*—and the feeling of this line is to be found in the right arm also.

In the fragment reproduced below, which was clipped from a newspaper portrait of a society debutante of known elegance and beauty, the hands are so placed as to neutralize by perspective the natural taper of the forearm; the wrist is turned also to show the parallel lines which exist in the prettiest arms, but which should never be shown; the hands are kept too much forward,

and no attention has been given to the finger movements. The result is deplorable, I may even say atrocious, yet a little care and skill could have made the hands in this portrait as attractive as those of Miss Ferguson.

Fig. 1. The attitude of the subject here exhibits dejection, and the hand indicates a pain somewhere inside. If this idea is correct, the result is justified, otherwise the hand would be improved by raising the thumb a little, bending the first finger so as to make it shorter than the middle finger, and turning the hand so as to narrow the back. The wrist should be raised and bent outward. There is little excuse for a hand placed on the stomach, unless the pain theory is correct.

Fig. 2. The right hand is very bad. The elbow should be dropped inward very slightly, the wrist turned decidedly and the hand thrown outward. This would produce a return curve or line of beauty beginning on the shoulder and ending in the hand. The left hand and wrist are too straight. The wrist should be raised and less of the palm shown. The idea of "calling" would then be better and more gracefully expressed.

Fig. 3. A grotesque effect. If the idea was to make it so, well and good, but it is evidently an essay at a character portrait. Four straight fingers never look well. Try this at the mirror with various finger movements and see how easily it may be improved.

Fig. 4. Again four repeating fingers. The first finger up, the third curved in and the little finger curved more, would add a decided charm. The elbow should have been thrown out enough to avoid the right angle at the wrist; then the unpleasant verticals of the arm would have become pleasing diagonal lines.

Fig. 5. All the fingers repeat each other, always undesirable. A little movement in and out would have given grace without materially changing the composition.

Fig. 6. Hands coarse and commonplace—almost uncouth. The right hand should have been rolled inward, dropping the fingers downward. Then by lifting the first finger and keeping it slightly under the next, a graceful hand would result. The right thumb should

have been drawn in and the finger curved slightly. Coarse hands require careful study.

Fig. 7. The hand here shown is almost a deformity. Rolling the hand in either direction and extending the fingers would have produced a better hand.

Fig. 8. Four parallels and a "spike" thumb. Turn the thumb down and bend the fingers; the first finger most, the two middles a little and the last finger more, and separate it somewhat. A better hand pose on the hip can be made by resting the hand on the second joints, curving the wrist; or, turn the hand completely over, disposing all the fingers in free curves.

Fig. 9. The left hand of the gentleman would be graceful if it had been placed palm down with the fingers extended easily. As it is, it looks "clumpy." The hand dropped on the table edge, with the wrist down, would have given this otherwise charming portrait much more ease, character, and style.

Plate VII Fig. 1. A striking example of the flat hand, so placed as to make it as uncouth and as large as possible. There

can be no excuse for such a pose. The fingers might have been gracefully disposed under the chin and along the edge of the face and so would have given an attractive hand.

Fig. 2. The hand holding the cigar is very unsightly and resembles a spread claw arrangement. The fingers repeat in almost identical form. The first two fingers holding the cigar would be improved by straightening somewhat. The last two fingers should be folded in, but not just alike. A very easy and satisfactory pose might have been developed in this case. It offers a good example for mirror practice.

Fig. 3. The worst case of facial distortion, hand deformity and parallel lines of the wrist I have ever seen. Even the right hand is clumpy and bad. No excuse exists for destroying the beautiful oval of such a face with the supporting hand, or for portraying the hand to the face as here. The opportunities for graceful poses of the hand close to the face are unlimited and this pose is one easy to manage. And yet this picture received a silver placque at an English exhibition!

Fig. 4. Here we have a pleasing portrait ruined by an amputated thumb. In this pose of the hand the whole thumb should always be shown, though the upper section may be bent very slightly in so as to avoid stiffness of line.

Fig. 5. A delightful pose spoiled in the making by— (1) a stiff left arm, angular fingers and square fist. Even the three fingers repeat their bad lines. (2) A right arm made wooden and the lovely forearm curves hidden by the fold in the gown; the back of the hand is shown too much, and the fingers are alike stiff and wooden. If the gown had been smoothed down, the wrist lifted and turned backward ever so little, and the fingers gracefully disposed in varied curves, the left wrist bent outward and the fingers of this hand given free play, the result would have been charming. This is a fairly easy pose and the reader is advised to repeat it with the simple changes mentioned and note the difference in the result.

Fig. 6. The left hand on the bust here just escapes being beautiful. The fingers should have been extended, the second and third wholly and the first just a little. The other hand is obviously bent too sharply at the wrist, the thumb is separated too much from the rest of the hand; the arm lines are obscured by the drapery, so that the wrist is made too narrow.

Fig. 1. Note the lead pencil forefinger in the lower left corner of this portrait and the three stumps accompanying it, with the disproportionate size of the fingers in this hand. To point these things out is sufficient condemnation.

Fig. 2. The evil of repetition of lines is carried to an extreme in this portrait. The right hand is inexcusably misshapen.

Fig. 3. The right forearm in this example resembles a soup bone, and the left arm is so posed as to give the undesirably thick wrist which the photographer should try to avoid. By simply curving the wrist out and giving the fingers freer play, a beautiful arm and hand could have been secured with this subject. Turning the wrist ever so slightly to get more taper to the arm would have helped very much.

Fig. 4. The hand holding the grapes is unpleasantly squared. By bending the wrist and permitting the hand to fall pendant towards the head, a happier arrangement of the hand and arm would have been gained. The other hand could have been improved by turning it slightly under the basket of grapes. With this change a thin wrist and pretty taper could have been secured.

Fig. 5. At first glance the finger paralleling the face seems to be part of the cheek, and gives too unpromising a line to this part of the face. The wrist is clumsy and too rigid for the slight weight it has to support. This may be a characteristic pose of the sitter, but just a little study of the picture on the ground glass would have shown the artist how to eliminate or soften the force of these defects.

Fig. 6. The hand here is ungainly almost to the point of caricature. An upward bend of the wrist would have given more virility and grace to the grip of the hand on the pipe. But there are so many good poses of the hand holding a pipe, and they come so simply, that it is hardly worth trying to improve this one.

Fig. 7. The apparently abnormal length of the fingers and thumb could have been reduced by the simple expedient of slightly curving them. The hand looks very much too large. By swinging the bowl of flowers away from the camera ever so little this could have been avoided without a change in the pose of the figure. A single rose falling over the side of the bowl would have relieved the length of the line also.

This plate is entirely made up of
Plate V examples of my own work. References to some of the examples shown will be found elsewhere in the text.

Fig. 1. Note the perfectly natural and graceful arrangement of the hands occupied with a book. The arm lines form complementary curves; the terminations of the left hand and arm are continued without a break into the book. There is a feeling of the line of beauty in both arms, and a connection of this line is very evident from one hand to the other, beginning at the left elbow.

Fig. 2. This is an example where the palm of the

right hand must be shown. By an outward throw of the right hand, curves are produced which obviate squareness of outline and result in an attractive hand.

Fig. 3 gives us an example of clasped hands. Many beautiful variations of this pose will suggest themselves. It is a graceful arrangement which does not offer much difficulty. Note the upward bend of the wrists, producing agreeable lines and terminations.

Fig. 4. This portrait serves to demonstrate how by the free and varied movements of the fingers and the upturned wrist, an average hand can be made really interesting and beautiful, adding attraction to the picture.

Fig. 5. The hands in this outdoor portrait were not posed. They were "observed" and could hardly have been improved by the most consummate skill of a painter.

Fig. 6. An example of carrying the line terminations to the object held by the hands. The fingers and wrist are admittedly bad.

Fig. 7. This was frankly made as a study of the head and hand. The pose of the hand exhibits my theories as to tapering the fingers by carefully overlapping them and curving the fingers and wrist. Examples of this treatment of the hands may be studied with profit in the works of Charles Chaplin, a famous French painter.

Fig. 8. This is an example of continuing and merging the lines of both arms and hands. The fingers are tapered by overlaps and curving as referred to on another page. This particular arrangement of the hands has given great satisfaction to the sitter wherever I have used it. Necessarily it gives the hands an important part in the portrait, and calls for a nice discrimination and restraint in its use.

The reader is also advised to study the treatment of the hands in the portraits reproduced in **THE PHOTO-MINIATURE: No. 136, Posing the Figure in Portraiture.** [This number is out of print, but may be seen at many public libraries if the reader cannot find a copy at his dealer's.—EDITOR]

The most instructive and attractive examples therein

available are Figs. 2 and 4, Plate I; Plate IV; Fig. 2, Plate V; and Plates VIII and X, except that in the latter the hands are unduly enlarged by the use of a short-focus lens. Also the right hand might have been dropped a little with obvious advantage. The other plates contain examples of things to be avoided, as for instance, the mother's clumpy hand in Plate IX, Fig. 2, and the formless left hand in Plate VI. The right hand in this portrait gives a clever example of the dropped wrist, which so often contributes to a good hand. Fig. 1, Plate II, shows the two hands prominently and badly placed, with every one of the eight fingers repeating its fellow in unvarying monotony. Fig. 1, Plate III, two very stiff hand poses which could easily have been made beautiful by slight changes. Arching the wrist and turning it to bring the hand down would have improved the left hand. The difference in the grace of line in Figs. 3 and 4 in Plate I is very pronounced. Fig. 4 could have been improved, as far as the left hand is concerned, by rolling the hand in until the thumb disappeared. Try this at the mirror and convince yourself how slight a change will work wonders in dealing with the hands.

**The Hands
in Groups** In the group portrait of the two ladies in the garden, Plate II, "The Greeting," note how the hands clasped in

greeting, and the continuity of the graceful lines of the arms and joined hands contribute not a little to the charm of this picture and serve to hold the figures together in unity of interest. The easy grace of the hand holding the hat, in a very prominent position, adds its meed of beauty. Had this picture portrayed four badly placed hands it would have been a failure, so much have the hands to do with its interest and success.

In the second example, "A Garden Tea," Plate II, the hands of the lady were self-posed. Nothing was necessary except to note that they were perfectly placed, and to make the exposure. It is just as important to be able to recognize a good hand pose as it is to be able to make a good one where the sitter does not unconsciously give it to you. Note the pleasing variety and grace of the finger movements, with the ease of the wrist lines in this example.

**Retouching
the Hands**

A word or two about the retouching of the hand may not be amiss as the last word of this discussion of the treatment of the hand in portraiture. Remember, first and last, the hand is an index to the character and personality of the sitter. Remember, too, that it is exquisitely sensitive as a medium of expression. You can destroy all the character in a hand, and make it a puffy monstrosity by overmuch retouching. But a certain amount of retouching is generally necessary in the hands of persons who have passed their youth. Too prominent veins must be made less obtrusive. Enlarged joints may need reducing in size or bulk—which is usually done by the careful use of the knife. Sometimes the thickness of a line will convert those verging on grossness or ugliness into very presentable hands. The pencil touch upon hands and arms should be light and free, without apparent length or force, and free from scratchiness. A short, spiral curve indicates the most desirable form of the touch.

Do not over-taper the fingers either by retouching or knifing. If this is apparent, the effect will be unpleasant. Find the happy medium and do not go beyond it. The tapering of the fingers is best accomplished by careful posing, as seen in Figs. 5, 7, and 8, Plate V.

The wrist can often be improved in shapeliness by perfecting its lines. Unsightly or prominent wrist bones need but a touch of the pencil or etching knife for their improvement. Similarly any prominent muscular development of the forearm, which may ruin the effectiveness of the lines of the arm, should be toned down with the knife. The hands of men seldom need the help of the retoucher.

CHARLES H. DAVIS.

Notes and Comment

The London Salon of 1918 seems to have been a remarkable exhibition in more ways than one—in the fact that it could be held at all, in the notable quality of the work shown, and in the very generous representation of American pictorial photography. About two thousand prints were submitted, out of which about four hundred were given place upon the walls of the exhibition, representing one hundred and sixty workers. Fully one-third of the exhibits were sent from this country, the work of California pictorialists being especially noteworthy. A critic says that the American work “proclaims a freshness of vision that has always been characteristic of American pictorialism at its best. It seems to embody a simplicity of treatment, compelling in its directness and original in its undertaking; features less apparent in the productions of the English pictorialists . . . who are bolder and more matter of fact in sentiment.” Exhibits were also received from Australia, Canada, Egypt, India, Spain, Holland, Sweden, Norway, Denmark, and Japan. France, for the first time, was unrepresented. A majority of the prints exhibited were bromides. There were also bromoil, oil, gum, platinum and carbon prints, with a few photogravures.

SODIUM BROMIDE. In the following letter, Johnson and Sons, writing to the editor of *Photography*, point out that sodium bromide can be substituted for potassium bromide in almost all photographic uses for the latter salt. As sodium bromide is listed at about half the price of the potassium salt, and is much more readily obtainable at the present time, the advantage of following the suggestion is obvious.

"*Sir*:—You are doubtless aware that the potassium salts are used very largely in munition work and are under control. They are therefore becoming more and more difficult to obtain. As sodium bromide is perfectly suitable for the photographic purposes for which potassium bromide is used, it seems to us to be the correct thing, and of national importance, for photographers to be asked to adopt it.

"We have made tests in our own darkrooms with various makes of bromide paper, and can confidently assert that when using in the bleaching bath sodium bromide instead of potassium bromide, there is no difference whatever in the resulting tone.

"As regards its use as a restrainer: here again the same quantity of the sodium bromide can be substituted for potassium bromide.

"We are quite sure that if your readers who are using potassium bromide, either as a restraining agent or as one of the bleaching chemicals in the sulphide process, will decide to use the sodium salt it will make a considerable difference, and will be reserving the potassium for much more important and necessary work.

"One of the standard formulæ for toning, but with sodium instead of potassium bromide, is the following:

"BLEACHING BATH. Potassium ferricyanide, 1 ounce; sodium bromide, 1 ounce; water, 20 ounces. For use, 1 ounce of the solution is diluted with 3 ounces of water.

"TONING BATH. Sodium sulphide, pure, $\frac{1}{2}$ ounce; water, 25 ounces. For use, 1 ounce of the solution is diluted with 3 ounces of water. Yours, etc.,

JOHNSON AND SONS, Manufacturing Chemists, Ltd."

GLYCIN. The work of replacing German-made developers proceeds slowly but surely. The latest arrival is a British-made Glycin, manufactured by Johnson & Sons, London. The new product, which is marketed as Glycin-Johnsons, is said to be in every way identical with German Glycin, and may be substituted for it in equal amount in any Glycin formula. The characteristics and methods of use of this developer are given in

detail in *THE PHOTO-MINIATURE* No. 167: *Modern Photographic Developers*, a second edition of which is just ready.

The Bass Camera Co., Dept. M., 109 North Dearborn Street, Chicago, Ill., has just published *Bargain Book No. 6*, which contains an exceedingly interesting array of bargains in cameras and accessories for amateur photography. A copy will be sent to anyone desiring it.

FRANCE imposes a luxury tax of 10 per cent, irrespective of the selling price, upon photographic appliances, lenses, and accessories. Photographs and photographic enlargements are included in another list of "luxuries," which are taxed to the same amount only when the retail price exceeds a given figure. In the case of portraits this is 40 francs per dozen; in the case of enlargements, it is 40 francs each.

THE PICTORIAL PHOTOGRAPHERS OF AMERICA have sent me a very dainty brochure, beautifully illustrated, which records the aims of this organization of pictorial workers, and its activities during its first year. The record is one worthy of great praise and makes interesting reading. Every reader of *THE PHOTO-MINIATURE* with pictorial aspirations should associate himself with this organization, which is national in scope, seeks the coöperation of all who are interested in the progress of pictorial photography, and has already done a lot of useful and constructive work in its chosen field. The membership fee is \$5 per year—a nominal sum considering the many advantages offered.

VERNON ROYLE. One of the most interesting human documents I have received this year is a modest booklet entitled "Efficient Machinery for Photoengravers," issued by John Royle & Sons, Paterson, N. J. From its

more than two hundred beautifully illustrated pages the reader may obtain a brief but sufficient summary of the life-work of Mr. Vernon Royle and his organization, in the invention and commercial production of machinery for process engravers. It is a noteworthy record of achievement in a field wherein America leads the world, viz., in the devising of machines which supplement or replace the work of the hand in arts and industries.

MEASURING THE ACTION OF INTENSIFIERS. *The British Journal of Photography*, in its issues of April 19 and 26, publishes a communication from the Eastman Research Laboratory to the Royal Photographic Society, with the title: "The Sensitometry of Photographic Intensification," by A. H. Nietz and K. Huse, which deserves a careful reading by those interested in the various processes of intensifying negatives now in use. Among other papers of a similar character, read before the R. P. S., we note one by Mr. F. F. Renwick on "The Relations between Optical Intensity and Quantity of Deposit in Prints" (not yet published), and "The Structure of the Photographic Image" by Mr. F. Krohn (not yet published). In *The Photographic Journal* of March last was reprinted the paper on "The Behavior of Scattering Media in Fully Diffused Light," by H. J. Channon, F. F. Renwick, and B. V. Storr, read before the Royal Society recently.

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Figures, Facts and Formulae of Photography [Second Series]

The first series of "Figures, Facts and Formulae," published in THE PHOTO-MINIATURE, No. 134, at the beginning of the great war now happily ended, met with so generous a welcome that a second edition was called for within six months after its first publication. As an experiment which involved a wide departure from the basic idea of THE PHOTO-MINIATURE, No. 134 was sent forth with some doubts as to its success. Its widespread sale, and perhaps half a hundred letters declaring it to be the most useful number of the Series, left no room for further misgivings on that score. Both editions have been out of print and unobtainable for a year or more, and the persistent demand for a summary of reliable photographic methods and formulae seems to justify a second adventure in the same field. In the following pages, therefore, I have gathered what seemed to me to be the most practical and useful of the methods and formulae published since the appearance of the First Series. It has meant a careful scouring of the pages of the photographic press of America, England, and Australia for the years 1915-1918 and a lot of laborious condensation. This Second Series contains nothing which appeared in the First Series, and, excepting half-a-dozen items too valuable to omit, nothing which has already been published in other numbers of THE PHOTO-MINIATURE. For which reason I indulge the hope that its information will be accept-

ably new to American readers, and offer a useful supplement to the First Series.

It is, perhaps, unfortunate that the many methods, formulæ and "short-cuts" evolved from the extensive use of photography during the war cannot be included in these pages. But the rigid restrictions governing the publication of this information have not yet been removed by the military authorities. During the past six months I have listened to not a few remarkable narratives (yarns would seem to be a better word), concerning these wartime emergency methods and innovations in photographic practice; but they were given me *sub rosa* and "not for publication." For example: there was a method for drying large bromide prints in ten seconds, as part of a larger scheme for turning out sixty finished bromide enlargements within twenty minutes after the small negatives had been received. But I can't say a word about it here.

As far as possible I have given credit to the authors or originators of the methods and formulæ here published, but there was too much uncertainty as to the sources of original publication to credit the journals from which the various items were gathered. I therefore make grateful acknowledgment here of the help received from all the photographic journals published here and overseas for English readers.

FOCUSING

To Graduate a Focusing Scale. The camera extensions for various distances are obtained by multiplying the focal length of the lens by the distance in inches and dividing the sum so obtained by the distance in inches less the focal length of the lens. Thus 20 feet distance with focal length of lens 5 inches, $240 \times 5 \div (240 - 5) = 5.1$.

Depth of Focus Tables. Few things are more useful to the hand camera worker than a depth of focus table computed for use with the particular lens and focus scale attached to his camera. With such a table, when focusing upon any object situated at any one of the "distances" given on the focusing scale, he can see at a

glance the number of feet before and behind the object focused upon, within which range all objects will be fairly well defined or reasonably sharp in the picture image. Such a table may be computed for any lens and aperture, used with a given focusing scale, by the following method. (E. S. Anderson).

To find the nearest distance from the camera, in front of the object focused upon, beyond which all objects will be in focus with any given aperture of the lens:—(1) Multiply the focal length of the lens by the diameter of the stop or aperture, and the result by the difference between the focal length of the lens and the distance of the object focused on—all expressed in inches. (2) Multiply the focal length by the diameter of the stop, and *add* 1-100th part of the distance of the object. (3) Divide (1) by (2), add the focal length, and subtract the result from the distance of the object. The result (in inches) will be the distance (or depth of field) in front of the object focused on, within which objects will be in focus.

To find the farthest distance from the camera, behind the object focused upon, within which other objects will be in focus with any given aperture of the lens:—Find (1) as before. (2) Multiply the focal length of the lens by the diameter of the stop and *subtract* 1-100th part of the distance of the object focused on. (3) Divide (1) by (2), add the focal length and deduct the distance of the object. The result will be the distance (or depth of field) behind the object focused on, within which objects will be in focus.

In computing such a table, the “distance of the object” factors should be the distances marked on the focusing scale, but expressed in inches. When the desired fore and aft distances have been computed for any given lens, they should be tabulated on a small piece of card, which may conveniently be fixed to the base of the camera with which the lens is used, for ready reference. Here is such a table, computed for a lens of $3\frac{1}{2}$ inches focal length.

Table Showing Depth of Field: $3\frac{1}{2}$ -in. Lens, using different stops, with focusing indicator adjusted at different distances. Circle of confusion 1-100th inch.

Stop <i>f</i> /	Focusing Scale Distances						
	6 ft.	8 ft.	10 ft.	15 ft.	25 ft.	50 ft.	100 ft.
7.5	4' 3" - 10' 6"	5' 3" - 18'	6' - 34'	7' 5" - Inf.	9' - Inf.	11' - Inf.	12' 4" - Inf.
11	3' 9" - 18'	4' 6" - 53'	5' - Inf.	5' 11" - Inf.	6' - Inf.	8' - Inf.	8' 7" - Inf.
16	3' 3" - 96'	3' 8" - Inf.	4' 2" - Inf.	4' 9" - Inf.	5' 5" - Inf.	6' - Inf.	6' 4" - Inf.
22	2' 9" - Inf.	3' 2" - Inf.	3' 5" - Inf.	3' 9" - Inf.	4' 2" - Inf.	4' 6" - Inf.	4' 8" - Inf.
32	2' 3" - Inf.	2' 7" - Inf.	2' 9" - Inf.	2' 11" - Inf.	3' 1" - Inf.	3' 4" - Inf.	3' 6" - Inf.

Where a smaller circle of confusion is desirable, as in small negatives made for after enlargement (wherein a circle of confusion not exceeding 1-250th of an inch is preferable to one of 1-100th), the factor "1-100th part of the distance" given in (2) in the method explained above should be altered to x D, where x is the circle of confusion desired. A very useful set of tables of this sort, calculated for a circle of confusion of 1-250th of an inch, was published in the catalogue of the C. P. Goerz American Optical Company, in 1913. Similar tables for lenses of 5-in., 5½ in. and 6-in. focal length were given in THE PHOTO-MINIATURE, No. 76.

COPYING AND ENLARGING

Copying Line Subjects. Amateurs, or those who have only occasional need for copies of engravings in books or cartoons and the like, will find Player's Method as practical as it is simple. This method, introduced in 1896, and recently republished, calls for neither camera nor plates, the copies being made by contact on bromide or gaslight paper, with artificial light. Its use, however, is limited to line subjects, without halftone, and the copy is necessarily of the same size as the original.

The method, briefly, is as follows. The print to be copied is placed face up on a few sheets of smooth, white paper, on a rigid, flat support, such as a drawing board. In the darkroom a sheet of bromide paper is placed

face down on the print, and pressed into close contact all over by putting on top of it a sheet of heavy plate glass, or a few sheets of picture glass, previously well cleaned and bound together at the edges for convenience of handling. The print, paper and glass screen on their support are now exposed to any convenient artificial light, placed directly under the light source. The length of the exposure will vary according to the actinic intensity of the light employed, the rapidity of the sensitive paper and the opacity of the paper stock on which it is coated. With a 16 c.p. carbon filament lamp, held about two feet away from the sensitive paper, an exposure of six to eight seconds may be taken as approximately correct. A few experiments with small strips of the paper employed will best determine the exposure required in any case. Development or gaslight papers will require longer exposures than bromide papers, and more powerful illuminants. After the exposure, development with amidol or any clean-working developer, fixing and washing, complete the process. With gaslight paper the darkroom may be eliminated.

This method necessarily gives a certain amount of fogging in the resultant print, but this is not sufficient to interfere with a fairly vigorous image, or seriously detract from the usefulness of the process. It has been suggested that green or light yellow glass should give more vigorous and clearer images. The copy obtained is, of course, a negative of the original, from which prints may be obtained in any convenient way.

Copying Colored Originals. To get a vigorous black and white reproduction of a letter typewritten in violet ink, use a panchromatic plate and the green (B) filter of the Wratten tricolor set. Architect's blue prints require a panchromatic plate and either the "A" or "F" Wratten filter. For a print or document strongly yellowed by age or stain, use a panchromatic plate and "G" or contrast filter. For general commercial work the K₁, K₂, K₃, Wratten tricolor set (red, green and blue), strong red "F," and strong yellow "G" filters will cover most requirements. For photographing furniture the tricolor "A" and the yellow "G" are

invaluable; for red mahogany the "A" filter; for satinwood and inlaid work the "G" filter will be found most useful. For maps, in flat tints a panchromatic plate and K₃ filter are advised (Mees).

White Background in Copying. When one has to photograph a vase, ornamental clock, or similar article, it is a great saving of time to be able to obtain full density of the ground, so as to avoid subsequent blocking out. A plan which gives very satisfactory results is as follows:—For the concave curved foreground and background, I use clean white blotting paper, which photographs as dense in the negative as anything which I have been able to find. Usually it photographs of quite sufficient density to yield a clear white in the print when the negative is of about the right contrast as regards the subject itself. The trouble most usually is with the background, which has to be some distance behind the subject in order to avoid shadows upon it, and so cannot be lighted so strongly as one could wish. What I do is to give it a little extra illumination with magnesium ribbon, burning the ribbon within a pair of shields, one on either side of the subject, so that no direct light reaches the lens. Thus, with an exposure which is usually more than a minute using a slow plate and a small stop, it is an easy matter to light a couple of short strands of magnesium ribbon, each hung within its shield, by means of a small spirit lamp, which is the best thing I know for igniting the magnesium quickly. The alcohol lamp used by dentists is suitable.

Copying Tracings. If size permits, fix the tracing against a window brightly illuminated by the skylight reflected from a sheet of white cardboard suspended outside the window at an angle of about 30 degrees. Then copy the tracing as a transparency. If a window is not available, pin the tracing up against the white cardboard and illuminate it as fully and as evenly as possible. Focus carefully to get the finest lines well defined, avoid underexposure, use a process or contrast plate and develop with amidol. Print on contrast grade gaslight paper. If the copy desired is to be a lantern slide yielding a blue-print effect on the screen, copy to the desired size on a lantern plate and tone the negative in the blue-

toning bath as for bromide prints. This is then bound up as the slide.

Reproducing Letters, Music, etc. A quick and ready method of obtaining facsimile reproductions of letters or any line subject printed on one side of the paper only, is that described by C. E. Owen, as follows: Lay the letter or design, face up, on the glass plate bed of any electric light printing machine, and on it, face down, lay a sheet of "hard" or "contrasty" glossy, gaslight paper, and make a negative print in the usual way.

Develop this in a full strength M-Q developer with plenty of bromide added to give clearness and contrast. When this negative print is dry, fasten it, face down on a piece of lintless blotter, cover the back with paraffin wax, and iron this well into the paper until it will absorb no more. This will make the negative translucent so that it can be printed from with reasonably short exposure. The positive prints are made from this negative in the machine, in the usual way, using the same paper and developer.

Enlarging to Scale (Lockett). This method enables the worker to enlarge accurately to any desired scale without the use of tables or guesswork, provided only that the focal length of the lens used is known. First focus sharply on the easel, but without stopping down the lens, an enlargement appreciably smaller than the one wanted, and carefully mark the position of the easel, or any portion of its sliding support, on the bench or rails. Measure, also, the length of any object in the enlargement, calling this measurement A. Then, assuming the negative remains as before, the distance the easel will have to be moved away from its marked position for the required enlargement may be ascertained by the following formula:—

Let F = focal length of lens,
 N = length of any object in the negative,
 A = length of same object in the trial enlargement,
 B = desired length of object in the actual enlargement.

Then, the easel difference, or distance between the first marked position of the easel and its final position =

$$F \times \left(\frac{B - A}{N} \right) - \left(\frac{FN}{A} - \frac{FN}{B} \right).$$

The calculation is quite free from difficulty after it has been worked out once or twice. Here is a typical example:—The worker, say, has photographed a stained glass window, which, in the negative, measures 2 ins. wide. From this an enlargement has to be made to show the window 8 ins. wide, the enlarging objective being of 6 in. focus.

The negative is projected on the easel until the image is seen to be a few inches smaller than required, and is focused sharply without stopping down. The enlarged window, when measured, turns out to be 5 ins. wide. The data, then, will be:—

$$F = 6 \text{ ins.}$$

$$N = 2 \text{ ins.}$$

$$A = 5 \text{ ins.}$$

$$B = 8 \text{ ins.}$$

Then, by the foregoing formula,

$$\begin{aligned} & 6 \times \left(\frac{8 - 5}{2} \right) - \left(\frac{6 \times 2}{5} \right) - \left(\frac{6 \times 2}{8} \right) = \\ & 6 \times \frac{3}{2} - \left(\frac{12}{5} - \frac{12}{8} \right) = \\ & 9 - \frac{9}{10} = \\ & 8 \frac{1}{10} \text{ ins., the required easel difference.} \end{aligned}$$

Accordingly, by measuring 8 1-10 ins. from the mark indicating the first position of the easel, making a second mark, bringing the easel to the latter, and racking in the lens until the image is in focus, the window will prove accurately 8 ins. wide.

For those who would like proof, it may be pointed out that with a negative measurement of 2 ins. and an enlargement to 5 ins., the ratio is 2½, and with a 6 in. focus lens the conjugates will be 8 2-5 ins. from negative to lens and 21 ins. from lens to easel. This 21 ins.,

then, corresponds to the first mark made for the easel. Similarly, an enlargement to 8 ins. will mean a ratio of 4, and the conjugates in this case will be $7\frac{1}{2}$ ins. and 30 ins. respectively. Subtracting $7\frac{1}{2}$ ins. from 8 2-5 ins., it is clear that the lens will be moved back 9-10 in. in focusing the second time; while, as 21 ins. from 30 ins. is 9 ins., the second position of the easel will be 9 ins. — 9-10 in., or 8 1-10 ins., as calculated by the formula.

Simultaneous Printing and Development. (F. J. Mortimer). The following method of combining exposure and development in bromide enlarging is the result of much careful experiment, and is claimed to be automatic in control and certainty. It may be used with all normal bromide papers, the exposure being subject to the usual conditions of intensity of light, character of negative and rapidity of the paper employed. Given correct exposure, the results are not distinguishable from those obtained by the usual enlarging methods.

Prepare the developer as follows: *A*—Hydroquinone, 180 grains; metol, 140 grains; sodium sulphite (crystals), 3 ounces; potassium bromide, 30 grains; water to make the solution to 20 ounces. *B*—Sodium carbonate, 3 ounces; water, 20 ounces. For use, mix 2 ounces *A*, 2 ounces *B*, and add 1 ounce of pure glycerin. The temperature of room and developer should be as near 60° Fahr. as possible.

In making the enlargement, the image is first carefully focused on the white surfaced enlarging board. The lens is then covered with the yellow glass cap and all white light excluded from the enlarging room. A sheet of dry bromide paper is now soaked or saturated with the mixed developer given above. This can be done by immersion, 5 ounces of developer being sufficient for sheet of paper 12 x 15 inches, or several sheets can be immersed and kept covered until needed. Or the saturation may be done by means of a soft brush, camel's hair mop or fine sponge.

Thus saturated with developer, the paper is affixed to the enlarging board, the lens uncapped, and the exposure and development will proceed simultaneously. The increased time of exposure in this method is little

more than that required for dry bromide paper. If the paper dries during the combined operations, it may be brushed over with a new supply of developer after capping the lens.

As soon as development is seen to be complete, the print is removed, washed, fixed and finished as usual.

Plain Glass Diffuser. A sheet of plain glass held in front of the lens when enlarging, if given a slight angular motion during the progress of exposure, will introduce a slight movement in the image of the enlargement, the result being a form of diffusion different from that obtained with bolting silk or other diffusing media hitherto employed. This diffusion can be controlled in various ways. Thus the thickness of the glass influences the effect obtained, and the angle at which the glass is turned, in relation to the passage of light to the screen, has much to do with the degree of diffusion. Even the interposition of a piece of thin glass, parallel with the plane of the sensitive paper, and fixed, so that there is no movement during exposure, gives the image a character quite different from that normally obtained without the screen or diffuser.

Wooden Trays for Large Prints. As a matter of expense in making large prints or enlargements, wooden trays, properly water- and chemical-proof, are a practical economy. For this treatment a couple of coats of Probus paint is the most direct and surest proofing material, but when this is not available the trays may be waxed. If wooden dishes are to be waxed to render them impervious, they should be made of a good quality of pine or deal with an even grain, and the inside should be sandpapered quite smooth. Then, while the dish is being made thoroughly warm, to just a little short of the scorching point, using an ordinary kitchen oven, the wax should be melted and heated in a water bath on top of the fire. With both the dish and the wax as hot as can be conveniently handled, the coating is applied with a brush that is not too stiff, as evenly as possible, working in a warm atmosphere. When the fire has gone out the dish may be put back in the oven, so that the wood will absorb more of the wax than it otherwise would, leaving it there until the next morning.

Chiffon and Bolting Silk. Chiffon has the advantage over bolting silk, as used to secure diffusion in enlarging, that the piece of chiffon need only be large enough to cover the lens with a margin of an inch or so, whereas if bolting silk is employed, the piece must be as large as the enlargement in hand, and stretched evenly over a piece of glass or a frame near to the enlarging board, or pinned over the sensitive paper on the board after the image is focused. In the use of chiffon, the degree of diffusion is varied by the number of thicknesses of chiffon stretched over the lens. When bolting silk is used, this is secured or varied by the distance away from the enlarged image at which the screen is held during the exposure. Most workers prefer the diffusion given by holding the bolting silk screen about one-eighth inch away from the enlarged image.

DARKROOM WORK

Chemical Poisoning, Remedies for. The simplest means for avoiding skin poisoning or irritation when working with alkaline developers or chemical solutions, is to bathe the exposed parts of the hands frequently in a weak acid solution, such as a 2 per cent solution of hydrochloric acid. Rubbing the hands several times a day with acetic acid No 8, 1 ounce; water, 2 ounces, to which a tablespoonful of salt has been added is said to cure certain kinds of skin poisoning. Hands which are stained with developer should be washed with a solution made up as follows:—Water 15 ounces; potassium permanganate, 15 grains; sulphuric acid, 15 minims. The smarting sensation resulting and the permanganate stain are removed by again washing the hands in oxalic acid, 90 grains; water, 10 ounces; after which the hands are thoroughly washed in water. When so cleansed, and free from irritating chemicals, the hands should be given a liberal application of cold cream or a healing ointment. A standard formula for the latter is as follows:—Ichthyol, 1 ounce; resorcin, 1 ounce; glycerin, 1 ounce; zinc oxide, $\frac{1}{2}$ ounce; white paraffin ointment, 6 ounces. In all cases of skin poisoning from irritant chemicals, it is advisable to consult a

physician, as the general condition of one's health plays an important part in the cure of local troubles of this sort. A soothing and healing ointment for chronic poisoning, given by Dr. Nathan T. Beers, is as follows:—Ichthyol, 1 dram; boric acid, 1 dram; zinc oxide, $\frac{1}{2}$ dram; Aristol, $\frac{1}{2}$ dram; petrolatum, 1 ounce. This should be applied to the fingers after cleansing, at night, washed off the morning after, the fingers well dried, and protected during the day by an application of flexible collodion.

Paper Negatives. The following formulas for the extra-sensitizing of bromide paper, for use in making paper negatives, are given by F. J. Stockley. As the papers used in the determination of the formulas were of English manufacture, slight modification may be necessary when American-made papers are employed.

Sensitize by bathing for one minute in one of the following baths, drain and dry on inclined glass plate over night—all in darkness; keep sensitized paper under slight pressure in light-proof box.

(a) Sensitol green: Stock solution $1\frac{1}{2}$ grains dissolved in $3\frac{1}{2}$ fluid ounces spirits of wine. Working solution, 25 minims; stock solution, 10 ounces water.

Very suitable for landscape work—a deep ruby light may be used with intelligent care when developing.

(b) Sensitol red: Stock solution $1\frac{1}{2}$ grains dissolved in $3\frac{1}{2}$ ounces spirits of wine (ethyl alcohol, or “pure” alcohol 90 per cent). Working solution, 25 minims; stock solution 10 ounces water.

Suitable for interiors with dark woodwork, furniture, etc. No ordinary darkroom light is “safe” for this sensitizer.

N.B.—A mixed bath of 12 minims each green and red stock solutions in 10 ounces water gives a paper sensitive to all colors.

(c) Sensitol violet: Stock solution $1/7$ th grain sensitol violet dissolved in $3\frac{1}{2}$ ounces spirits of wine. Working solution: Water, 10 ounces; spirits of wine, 4 ounces; stock solution, 2 ounces.

Sensitizes to all colors—no light may be used in development.

Notes: (1) Water must be free from carbonic acid.

(2) Stock solutions keep indefinitely in the dark, as does also violet working solution.

Exposure: Reckon speed of sensitized papers about 125H, and D, or equal to a "medium" speed plate.

Development: Any non-staining developer—M-Q, amidol, etc., may be used.

Potassium and Sodium Salts. Wherever potassium bromide is called for in photographic formulas, an equal amount of sodium bromide may be substituted with equal effect. The following note shows equal work done by the different alkalies used in developing solutions: Caustic potash, 112 parts; caustic soda, 80 parts; potash carbonate, 165 parts; soda carbonate (dry), 100 parts; soda carbonate (crystals), 286 parts. It is true, however, that in pyro and hydroquinone development, the use of the potash salt gives at first a more energetic action of the developer, but in the end there is no difference.

Test for Purity of Paramidophenol (L. H. Wallace)—Add 10 grains paramidophenol-hydrochloride to 1 ounce distilled water in a clean glass vessel. If the sample is pure, it will dissolve readily and give a clear, colorless solution which will remain clear for several hours. If when first prepared the solution shows a purplish, yellowish, or greenish color, this denotes the presence of dye-stuff; if particles of insoluble matter remain in suspension in the solution, this indicates the presence of organic impurities; both are detrimental to the keeping and developing power of the sample, in proportion to the showing on test.

Tests for Purity of Metol or Metol Substitutes (L. H. Wallace).

Alcohol Test. First: Metol is insoluble in alcohol. Paramidophenol-hydrochloride and hydroquinone are both completely soluble in alcohol. Inasmuch as metol substitutes are frequently cheapened, and their developing power lessened, by the addition of one or both of these, this test for the purity of metol may be profitable. A weighed sample of "metol" is well shaken in ten parts of alcohol, the residue caught on a filter paper and weighed again when dry. Any loss of weight shows adulteration. Any chemical sold as metol which is soluble in alcohol may be condemned at once.

Bichromate Test. The bichromate of ammonia test is not so simple but is of the highest value, especially in making comparative tests with a known sample of pure metol. First prepare a 10 per cent solution of ammonium bichromate, and a solution of 10 grains to each ounce of water of each sample of metol to be tested. Now take a sheet of clean white blotting paper, such as World Photo Finish, and pour about half a dram of each solution to be tested on different parts of the blotter. Then drop *one drop* of the bichromate solution (by the aid of a medicine dropper) on each wet surface. With *pure* metol solution, a dark, purple-black ring will form at once, with a yellow-colored center, requiring several minutes for the yellow color to darken by oxidation. With impure metol or substitute, the center of the ring will immediately turn dark and the edges will not be clearly defined.

DEVELOPERS AND DEVELOPMENT

Monomet for plates or films. Water, 20 ounces; sodium sulphite (crystals), 240 grains; sodium carbonate (crystals), 240 grains; 10 per cent potassium bromide solution, 20 to 40 minims; Monomet, 20 grains. For use, take 1 part of above and 1 part water.

Monomet-Hydroquinone (Concentrated). Water, 10 ounces; sodium sulphite (crystals), 528 grains; caustic soda, 44 grains; potassium bromide, 8 grains; Monomet, 70 grains; hydroquinone, 70 grains. Dissolve the Monomet and hydroquinone in 2 ounces warm water, the caustic soda in 2 ounces water, and the sulphite and bromide in another 2 ounces water. Add the Monomet solution to the sulphite, stir well and add the caustic solution. The precipitate formed on mixing the sulphite and Monomet will dissolve on the addition of the caustic. Then make the total bulk of the solution up to 10 ounces with water. For use, this developer may be diluted 1 part to 20 parts of water.

Monomet-Pyro for plates or films. Solution *A*; Water, 20 ounces; Monomet, 20 grains; pyro, 40 grains; potassium metabisulphite, 96 grains. Solution *B*; Water, 20 ounces; sodium carbonate (desiccated),

400 grains; potassium bromide, 16 grains. For use, mix equal parts of *A* and *B*.

Monomet Tank Developer. Water, 40 ounces; Monomet, 7 grains; hydroquinone, 18 grains; sodium sulphite, (desiccated), 350 grains; sodium carbonate, 70 grains; potassium bromide (10 per cent solution) 10 drops. With this formula, used at 65° Fahr., development will be complete in 20 to 22 minutes.

Elon-Hydroquinone for X-ray negatives. Water, 20 ounces; Elon, 20 grains; sodium sulphite, 1 ounce; hydroquinone, 80 grains; sodium carbonate, 1 ounce; potassium bromide, 8 grains. Where Elon is not obtainable substitute Tozol for the *combined* amounts of Elon and hydroquinone given in this formula.

Tozol for Lantern Slides. Make up two solutions. *A*: Water, 16 ounces; sodium sulphite, 130 grains; Tozol, 130 grains. *B*: Water, 16 ounces; sodium carbonate, 100 grains; potassium bromide, 15 grains. For normal density, use equal parts *A* and *B*. For softer results dilute with an equal volume of water.

Concentrated Developers. It is well known that if a formula for an ordinary developing solution is taken (and there are many hundreds of them) and the quantity of solvent, *e. g.*, water, is reduced to, say, one quarter, the chemicals will generally refuse to entirely dissolve, and some will remain in solid form in the liquid. If it is boiled they may dissolve, but on the solution cooling are again precipitated as solids. The use of caustic alkali, *e. g.*, sodium hydrate or potassium hydrate, instead of the carbonate will, however, in many cases enable a much greater degree of concentration to be arrived at. Either of the following formulas are typical examples of highly concentrated developers:

Hot water, 10 ounces; sodium sulphite (crystals), 4 ounces; metol (or any reliable substitutes), 100 grains; hydroquinone, 200 grains; sodium hydrate, 200 grains. Be careful to get complete solution, adding, if needed, more caustic alkali to facilitate this.

Hot water, 10 ounces; sodium sulphite (crystals), 3 ounces; paramidophenol-hydrochloride (Kodakon or any other reliable brand), 1 ounce; sodium hydrate, q. s.

Add the caustic soda in strong solution until there is

complete dissolving of the paramidophenol base precipitate first formed.

Borax M-Q Developer (Wellington). This developer, in which borax replaces the usual alkali, is said to give negatives of fine grain, and free from fog or stain. For this reason it is advised for the development of pocket camera or other small negatives intended for enlargement. A full exposure yields the best results. Water (hot), 20 ounces; borax (powdered), 200 grains; metol, 20 grains; hydroquinone, 50 grains; sodium sulphite (crystals), 200 grains. Dissolve in the order given and let each ingredient be completely dissolved before the next is added. The developer keeps well if stored in well-stoppered bottles.

Hydroquinone for great contrast or process plates (Wellington). This developer should not be used at a temperature below 60° Fahr. Hydroquinone, 80 grains; sodium sulphite, 1 ounce; potassium hydrate, 80 grains; potassium bromide, 10 grains; water, 20 ounces.

Amidol (Diamidophenol) for bromide papers (Wellington). Make this developer fresh as needed, dissolving the sodium sulphite first and then adding the amidol. Water, 20 ounces; sodium sulphite (crystals), 650 grains; potassium bromide, 10 grains; amidol, 50 grains. Compounded as here given this solution will retain its developing efficiency for two or three days.

"B. J." Pyro-Soda. A world-famous formula. Make up two solutions as follows: *A*. Pyro, 1 ounce; sodium sulphite (crystals), 8 ounces; potassium metabisulphite, 1 ounce; water, 60 ounces. *B*. Sodium carbonate (crystals), 12 ounces; water, 60 ounces. Mix 1 part *A*, 1 part *B*; water, 2 parts.

In making up the *A* solution the sulphite and metabisulphite should be mixed together dry and put together into hot water. When they are dissolved, the solution should be boiled for one minute and allowed to cool, when the pyro is added. This developer produces negatives free from pyro stain and 4 to 6 minutes development at normal temperature, with full exposure will produce negatives full of detail and well suited to enlarging. The special advantages of the developer

are its cleanliness and the extraordinary keeping quality of the *A* solution when made up as given above.

For stronger negatives, take equal parts of *A* and *B* and of water or equal parts of *A* and *B* alone; this latter mixture giving a developer containing 4 grains pyro to the ounce. The mixed solution can be used for several plates in succession if a little extra time is allowed in each case.

Pyro for Bromide Prints. (D. Ireland). The following formula gives a clean working, non-staining developer, yielding bromide prints of a rich, warm black tone. Water, 4 ounces; sodium carbonate (crystals), 220 grains; sodium sulphite, (crystals), 120 grains; sodium acetate, 70 grains; potassium bromide, 5 grains; acid sulphite solution, 5 drams. This acid sulphite solution is made up as follows: Water, 8 ounces; sulphuric acid, $\frac{1}{2}$ ounce; sodium sulphite (crystals), 4 ounces. For use add 5 grains dry pyro to 4 drams of the stock developer solution above given and make up to 2 ounces with water. Keep the developer moving over the print but do not agitate the solution unnecessarily. There is no loss of density in fixing, so remove the print as soon as the desired strength is reached. Wash in running water for 2 minutes and fix in: Water, 10 ounces; hypo, 2 ounces; acid sulphite solution, $\frac{1}{2}$ ounce. If sepia prints are desired, bleach the fixed and washed prints in: Water, 10 ounces; sodium chloride, 200 grains; potassium ferricyanide, 20 grains, and afterwards sulphide in the usual way.

Non-Staining Pyro for Negatives. Make up two stock solutions. No. 1: Water, 27 ounces; pyro, 1 ounce; potassium metabisulphite, $\frac{1}{2}$ ounce. No. 2: Water, 27 ounces; sodium carbonate (crystals), 4 ounces; sodium sulphite, 6 ounces. For thin, detailful negatives, take for use, No. 1, $\frac{1}{4}$ ounce; No. 2, 1 ounce, and add water to make 8 ounces. This contains $\frac{1}{2}$ grain pyro per ounce of developing solution and the Watkins' factor is 12. It keeps in excellent working order for 12 months.

Serchol-Pyro for Under-Exposure. Make up two stock solutions: *A*. Water, 20 ounces; serchol, 40 grains; pyro, 48 grains; metabisulphite of potash, 100 grains. *B*. Water, 20 ounces; sodium carbonate

(crystals), 2 ounces; potassium bromide, 10 grains. For use, take 1 part solution *A*, and $1\frac{1}{2}$ parts or 2 parts solution *B*, according to the degree of under-exposure feared.

White Image Developer, for dry ferrotypes (gelatine emulsion). Valenta gives the following formula for a developer which will give a fairly white image on the modern, dry ferrotype plate. Hydroquinone, 35 grains; sodium sulphite (dry), 140 grains; ammonium carbonate, 420 grains; water, 16 ounces. This developer does not keep well and is best prepared day by day as needed.

Pyro-Tank Developer for Portrait Films. A typical and thoroughly good developer for use with the open-tank method is that recommended for Eastman Portrait, Commercial, and Ortho. Films. This is based on the use of a neutral sulphite obtained by the combination of sodium sulphite and sodium bisulphite, as follows: Pyro, 1 ounce and 85 grains; E. K. Co. sulphite of soda, 6 ounces and 175 grains; sodium bisulphite, $1\frac{1}{2}$ ounces; E. K. Co. carbonate of soda, 2 ounces; potassium iodide, 5 grains; water up to 1 gallon.

The following instructions *must* be strictly followed, as the keeping qualities of this developer depend entirely upon the method of preparation.

Dissolve the sulphite first in 1 quart of hot but not boiling water. When dissolved, add the bisulphite and then *boil* the solution for 5 minutes. Cool to about 70° Fahr. and add the pyro. Dissolve the carbonate in 1 pint of warm water, then add the iodide. Pour these two solutions into the tank and make up to 1 gallon of water.

The most satisfactory temperature for developing is 65° Fahr. The solution should not be used below 60°. When the developer is first made and used, the developing time at 65° Fahr. is about 18 minutes.

After the developer has been used for several batches of plates or films, it will be necessary to strengthen it with the addition of each new batch. The strengthening solution is made by dissolving the chemicals named in the following formula and using exactly the same method for preparing it as when preparing the first developer.

Pyro, $\frac{1}{4}$ ounce; E. K. Co. sulphite of soda, 1 ounce and 150 grains; sodium bisulphite, 150 grains; E. K. Co. carbonate of soda, 3 ounces and 50 grains; potassium iodide, 4 grains; water up to 60 ounces.

Add this strengthener to the developing solution in the tank as needed, to keep up the developing strength of the solution as this decreases in use.

Development, Equivalent Times at Different Temperatures. The following table, devised by Gaston M. Alves, shows at a glance the equivalent times, in minutes and half minutes, required to reach any given density at different temperatures between 60° to 72° Fahr.

Deg's	Minutes																													
	13	13½	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	12½	13	13½	14	15	16	17	18	19	20	21	22	
60	13	13½	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	12½	13	13½	14	15	16	17	18	19	20	21	22	
61	12½	13	13½	14	15	16	17	18	19	20	21	22	23	24	25	26	27		12½	13	13½	14	15	16	17	18	19	20	21	22
62	12	12½	13	13½	14	15	16	17	18	19	20	21	22	23	24	25	26		12	12½	13	13½	14	15	16	17	18	19	20	21
63	11½	12	12½	13	13½	14	15	16	17	18	19	20	21	22	23	24	25		11½	12	12½	13	13½	14	15	16	17	18	19	20
64	11	11½	12	12½	13	13½	14	15	16	17	18	19	20	21	22	23	24		11	11½	12	12½	13	13½	14	15	16	17	18	19
65	10½	11	11½	12	12½	13	13½	14	15	16	17	18	19	20	21	22	23		10½	11	11½	12	12½	13	13½	14	15	16	17	18
66	10	10½	11	11½	12	12½	13	13½	14	15	16	17	18	19	20	21	22		10	10½	11	11½	12	12½	13	13½	14	15	16	17
67	9½	10	10½	11	11½	12	12½	13	13½	14	15	16	17	18	19	20	21		9½	10	10½	11	11½	12	12½	13	13½	14	15	16
68	9	9½	10	10½	11	11½	12	12½	13	13½	14	15	16	17	18	19	20		9	9½	10	10½	11	11½	12	12½	13	13½	14	15
69	8½	9	9½	10	10½	11	11½	12	12½	13	13½	14	15	16	17	18	19		8½	9	9½	10	10½	11	11½	12	12½	13	13½	14
70	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½	14	15	16	17	18		8	8½	9	9½	10	10½	11	11½	12	12½	13	13½
71	7½	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½	14	15	16	17		7½	8	8½	9	9½	10	10½	11	11½	12	12½	13
72	7	7½	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½	14	15	16		7	7½	8	8½	9	9½	10	10½	11	11½	12	12½

Developing and Fixing at High Temperatures. (J. H. Crabtree). Rollfilms, film packs, and plates, whether new or date-expired, may be successfully developed under tropical conditions (up to 95° Fahr.) by means of most developers, with the addition of 10 per cent sodium sulphate and some potassium bromide to prevent fog, but much better with a special developer compounded with paramidophenol-hydrochloride. Although it has been recommended to develop films in the tropics by hardening the same either before or after development by the addition of a hardener such as formalin, it is only possible to secure the best results

by using a developer free from such additional agents. The formula for the developer is as follows: Paramidophenol-hydrochloride, 60 grains; sodium sulphite (E. K. Co.), 440 grains; sodium carbonate (E. K. Co.), 440 grains; water to 20 ounces.

After development rinse only for a second or two before placing in the fixing bath, otherwise the film is apt to soften in the rinse water.

The time of development with Eastman N.C. film at 95° Fahr. for normal contrast is 1½ minutes, though the time of development may be doubled by the addition of 880 grains of sodium sulphate to the above quantity of developer.

At temperatures up to 75° Fahr. the regular acid fixing bath should be used, but at temperatures up to 85° Fahr. the following chrome alum bath is necessary: Hypo, 7 ounces; sodium sulphite (E. K. Co.), 1 ounce, 175 grains; potassium chrome alum, 2 ounces, 350 grains; acetic acid (glacial), 40 minims; water to 32 ounces. This is made up by avoirdupois weight. Dissolve the sulphite and chrome alum together and add to the hypo solution, finally adding the acetic acid.

At temperatures up to 95° Fahr. the following formalin bath should be employed: Hypo, 9 ounces; sodium sulphite (E. K. Co.), 1 ounce, 350 grains; formalin (formaldehyde 40 p.c.), 4¼ ounces; water to 32 ounces. Avoirdupois weight. First dissolve the hypo then the sulphite, and finally add the formalin.

In order to eliminate the odor of the formalin, the bath should be inclosed in a covered tray as far as possible. The above baths keep well at the temperatures stated, so that for the professional and amateur finishing trade the special chrome alum bath is very suitable, while for expeditionary work, where very high temperatures may prevail, the formalin bath will give perfect results.

FIXING

Acetate-Fixing-Hardening Bath. A clean working bath, particularly advisable for use in hot weather is as follows: Water, 35 ounces; hypo, 9 ounces; chrome alum, 120 grains; sodium acetate, 400 grains.

Acid Fixing Without Acetic Acid. (AnSCO). A reliable bath of this sort for fixing prints on development papers is made up as follows: Water, 60 ounces; hypo, 1 pound; when dissolved add the following solution, previously prepared: Water, 4 ounces; sodium bisulphite, 2 ounces; powdered alum, 1 ounce. The use of a short-stop between developing and fixing these papers is absolutely necessary, and this bath is readily prepared by dissolving $\frac{1}{2}$ ounce citric acid in 32 ounces water.

Hypo-Metabisulphite. A thoroughly good fixing bath for negatives, easily made, stainless and economical in use, is made up as follows: Dissolve 4 to 6 ounces hypo in 20 ounces of hot water. When cool, add $\frac{1}{2}$ ounce potassium metabisulphite, stirring vigorously to get complete solution.

Combined Fixing and Hardening Bath for Bromide Prints. (Wellington). Hypo, 4 ounces; potassium metabisulphite, 60 grains; chrome alum, 240 grains; water, 20 ounces.

Citric in Place of Acetic Acid. 2 ounces of Glacial acetic acid can be replaced by 2.13 ounces of citric acid. 2 ounces of 28 per cent acetic acid are replaced by .59 ounce citric acid.

Chrome Alum Fixing Bath for plates or films. (E. K. Lab.). Dissolve 5 lbs. hypo in $1\frac{1}{2}$ gallons warm water. When dissolved, add the following hardener while stirring briskly. Water, 32 ounces; sodium bisulphite, $\frac{1}{2}$ pound; chrome alum, 2 ounces. Add water to make bulk of solution up to $2\frac{1}{2}$ gallons.

Plain Acid Fixing Bath. (E. K. Co.). Dissolve $12\frac{1}{2}$ pounds of hypo in 3 gallons of water. When thoroughly dissolved add 32 ounces of a solution made by dissolving 4 pounds sodium bisulphite in 64 ounces of water.

Hardener for Films, to be used after fixing. (AnSCO). Three solutions are made as follows: No. 1, water, 85 ounces; sodium sulphate, 3 ounces; acetic acid No. 8, 1 ounce. No. 2, water, 86 ounces; alum (powdered), 9 ounces; acetic acid No. 8, 1 ounce. No. 3, water, 85 ounces; borax (powdered), 2 ounces; acetic acid No. 8, 1 ounce.

The solutions must be made up separately, and when

all the chemicals are thoroughly dissolved, mix the three solutions. After the films are fixed, rinse in a few changes of water and place in the hardener for 5 minutes, then wash as usual. Films so treated dry very quickly and artificial heat may be used without danger of melting or cracking. The films do not become brittle, as so often happens when formaldehyde is used.

Hardener for Negatives, to be used instead of varnishing where dampness is feared. It gives a tough, glasslike film, so hard that it is repellent of water. Water, 32 ounces; powdered alum, 4 ounces; tannic acid, 120 grains. The negative is immersed in this mixture after fixing and washing and should not be kept in the hardener longer than 4 minutes.

Test for Hypo Elimination. Dissolve 8 grains permanganate of potash, and 7 grains of caustic soda in 8 ounces of water. To test prints which have been washed and ascertain whether any hypo remains, fill a tumbler with water and add a few drops of the above permanganate solution. Take two or three prints from the wash water and allow the water from the prints to drip into the glass. If any hypo is present in the prints, the violet color of the water in the glass will change to a slightly greenish tinge. In such a case return the prints for longer washing.

INTENSIFICATION

Mercuric Iodide, Single Solution Intensifier. (Rajar). Useful for thin, under-exposed negatives, or for strengthening weak portions of interior or flashlight negatives. Crush 100 grains mercuric chloride to powder, place in a small, linen bag, and suspend this near the neck in a 20-ounce, wide-mouthed bottle filled with hot water. When the chloride has completely dissolved, remove and burn the bag, and add a few crystals of potassium iodide to the mercury solution, shaking the bottle all the time during this addition. The solution assumes a salmon color, at first opaque. Add the iodide cautiously, and only until the solution becomes clear and transparent, with only a trace of color. At this point add a crystal of hypo the size of a pea, and the intensifier is ready for use.

The negative, after fixing and washing, is immersed in this intensifier for a few minutes, when it will gain the desired strength. To ensure complete after-permanency it may be placed for a few minutes in any clear working developer and again washed, but this is not necessary in ordinary cases and is not intended as redevelopment.

Copper Intensifier, giving great intensification for line subjects. Mix two solutions with hot water, as follows: *A.* Copper sulphate, 100 grains; water, 1 ounce. *B.* Potassium bromide, 100 grains; water, 1 ounce. Mix *A* and *B* and allow to cool. Bleach the negative in this mixture, wash for a few minutes in running water, then blacken in a solution of silver nitrate, 45 grains; water (distilled), 1 ounce.

If still greater density is required, wash the negative to remove any free silver from the film and develop in any clean working developer.

Wellington's 1918 Silver Intensifier. Since the First Series: "Figures, Facts and Formulæ" was published the formula for the Wellington Silver Intensifier has been modified as follows: First, harden the negative film by immersing for 5 minutes in water, 10 parts; formalin, 1 part. Rinse the plate for a few minutes and then place for exactly 1 minute in: potassium ferricyanide, 20 grains; potassium bromide, 20 grains; water to make 20 ounces. This bath should never be omitted; it prevents staining of the negative during intensification. Rinse the plate for a few minutes and intensify in the following. *Stock Solution A:* Silver Nitrate, 800 grains; distilled water, 20 ounces. *Stock Solution B:* Ammonium sulphocyanide, 1400 grains; hypo, 1400 grains; water, 20 ounces. These solutions keep indefinitely. For the intensifying bath $\frac{1}{2}$ ounce of *A* is added to $\frac{1}{2}$ ounce of *B*, stirring vigorously with a glass rod to get a clear solution. To this mixture add 1 dram of a 10 per cent solution of pyro preserved with sulphite of soda, and 2 drams of a 10 per cent solution of ammonia. Work with a white porcelain tray. When intensified clear in acid hypo bath and wash well.

Chromium Intensifier, useful for fully-exposed but insufficiently developed negatives, is given as follows by J. H. Hepworth: Crush 50 grains potassium bich-

romate to powder and dissolve in warm water, 5 ounces; to this add 25 minims of pure hydrochloric acid. This forms the acid-bichromate bleach, which is flowed over the fixed and washed negative while the tray is being steadily rocked. Continue this bleaching until the whole negative shows a strong yellow color, with thorough change through the film. Remove as much as possible of the yellow stain by washing, after which re-develop the negative in an amidol or Monomet-quinol developer, this re-development being carried out in weak daylight or gaslight. A final, thorough washing completes the method, which is equally useful for negatives, lantern slides or weak bromide prints. Bayley adds that where only slight intensification is needed, the amount of hydrochloric acid in the above formula may be increased four times, leaving the bichromate and water unchanged as in the formula. If, however, considerable intensification is desired, the amount of bichromate given in the formula may be halved, and only one fifth of the quantity of acid used. With these modifications this intensifier permits of perfect control for almost any purpose.

Moberly advises the same formula, but recommends a stock solution for repeated use, adding 20 minims of a 10 per cent potassium bromide solution to each ounce of the acid-bichromate solution, which aids in its preservation. After bleaching the plate in this and three rinsings to clear surface coloration from the film, the plate is cleared of bichromate stain by immersing it in a bath made up as follows: Potassium metabisulphite (saturated solution), 1 part; sodium carbonate, (saturated solution), 1 part; water, 4 parts. After half a minute in this bath the plate is rinsed and the operation repeated with fresh baths two or three times to completely discharge the bichromate stain from the film. This done, the negative is re-developed in an ortol developer. First prepare the usual ortol stock solution, viz: Ortol, 70 grains; potassium metabisulphite, 35 grains; water, 10 ounces. This should be filtered. For re-development, take 3 parts ortol stock solution, and 2 parts of a saturated solution of carbonate of soda, without either sulphite of soda or

potassium bromide. In re-development the image changes color and darkens in regular and even action. There is no need to carry re-development out to its fullest extent. The plate may be withdrawn at any stage, when the desired intensity has been secured. Thorough washing and drying complete the process.

An amidol developer may, of course, be employed in place of the ortol recommended, but Moberly prefers ortol as, in his experience, more easily controllable and certain.

REDUCTION

Permanganate-Persulphate Reducer. (E. K. Lab.).

Huse and Nietz have worked out a modification of the Deck formula for the proportionate reduction of over-developed negatives, as follows: Prepare two solutions—*A*: Potassium permanganate, 22 grains; sulphuric acid, 10 per cent solution, 130 minims; water, 20 ounces. *B*: Ammonium persulphate, 220 grains; water, 20 ounces. To make the reducer 1 part of *A* is mixed with 3 parts of *B*. The time of reduction is from 1 to 3 minutes, but the action may be rendered slower and more controllable by diluting the reducing solution with an equal bulk of water. As soon as reduction is complete, the negative is immersed for 5 minutes in a 1 per cent solution of potassium metabisulphite, after which it is finally washed for 10 or 15 minutes.

This reducer is best used with dry negatives. Its results vary somewhat according to the temperature of the solution, being greater in reduction at higher temperatures, and also according to the kind of plate and developer employed.

Persulphate-Hypo Reducer. T. H. Greenall advises the following modification of the normal persulphate reducer, as giving greater regularity of action and control. Make a stock solution of hypo containing 30 grains of hypo per ounce of water. To make the reducing solution, dissolve 30 grains of ammonium persulphate in 1 ounce of water, and add 1 ounce of the stock hypo solution. The energy of this reducer may be increased by adding a larger proportion of hypo—up to 4 times the amount given in the formula above.

The time of reduction can also be shortened by increasing the quantities of both persulphate and hypo (per ounce of water).

Hypochlorite Reducer. A useful reducer for over-developed negatives, which softens and reduces the contrasts somewhat, is as follows: Pour a 2 per cent solution of hypochlorite of soda over the negative and gently rock the tray for a few seconds. Then take a small tuft of absorbent cotton, dip it in the solution and gently rub the film of the negative from top to bottom and right to left, rinsing the plate under the tap and washing out the cotton every few seconds until the desired reduction is obtained. Then wash the negative under the tap and immerse it in: Water, 20 ounces; pure hydrochloric acid, 25 minims, which will stop the action of the hypochlorite and clean the film thoroughly. After 3 to 5 minutes in this bath, wash the negative for 20 minutes and dry. This reducer gives a perfect film surface for knife or pencil work.

RETOUCHING

To Eliminate the Need for Retouching. It is practicable to eliminate fully 50 per cent of the retouching needed in the average studio by (1) systematizing methods and materials in studio and darkroom so as to get negatives requiring a minimum of retouching or after-treatment; (2) the use of double-coated ortho or panchromatic plates or the new Portrait-Films with a $K1\frac{1}{2}$ Wratten filter (requiring about twice the normal exposure); (3) adapting lighting methods and exposure to yield soft, fully exposed negatives; (4) using a soft focus lens with discretion; (5) the use of such a developer and method of tank development, such as the Core System, permitting perfect control over the color and printing density of the negative; (6) diffusion of definition by double printing with screens of varying thicknesses and interposed between negative and paper for part of the exposure; and (7) the use of a special screen such as the Artograph Screen. The use of thin, fully detailed negatives, of the right printing color to give vigorous modeling, with rough-surfaced

printing papers is another very practical method of eliminating the need for retouching.

PRINTING METHODS

Sepia Prints by Direct Development. This method is generally employed with development papers coated on buff-coated stock, either rough or matt surface finish as may be desired. Note first that the warmth or richness of the brown tones obtained depends largely on a careful determination of the exposure required with any given negative and paper, and that full development is always essential to the preservation of the delicate halftones in a well-modulated print. The exposure for such prints will always be from six to ten times longer than that required for a black and white print from the same negative, and this adjustment of exposure and development to the negative and paper in use should first be determined before a large batch of prints is made.

Developer. Those who prefer to make their own ammonium oxalate and ferrous oxalate instead of using the commercial articles will find the methods for preparing these given below. To prepare the developer required, dissolve 2 ounces of ammonium oxalate in 14 ounces of hot water; add 3 drams ferrous oxalate, 16 grains ammonium bromide, 1 dram oxalic acid (poison), and 2 grains potassium iodide. Stir well after each addition, with a glass rod, until the color of the solution is a transparent orange. Now add 6 ounces of cold water and 2 drams pure alcohol. When cold this solution is ready for use.

Exposure. The exposure is most conveniently made by weak or diffused daylight, as at a window with a northerly aspect, facing the sky. It will vary, according to the negative, from six to ten times the normal exposure needed with the same light for a black development print. Ascertain the exposure by repeated tests until you get the rich color desired in the print, with all the halftones.

Develop the print in the solution given above, working in a safe light, and let the development proceed

until thoroughly complete, judging by the halftones and shadow detail in the print and its general color.

As soon as development is completed dip the print for a moment or two only in a weak acid bath consisting of 1 fluid ounce acetic acid No. 8 in 20 fluid ounces water.

Fixing and Washing. From the acid bath the print is immediately placed in the fixing bath, previously prepared as follows: Dissolve $2\frac{1}{2}$ ounces hyposulphite of soda in 20 ounces of warm water and allow to get cold. Let the print remain in this fixing bath fully 5 minutes, turning it over occasionally or keeping the solution in motion to ensure complete fixation of the print. Wash in running water for 15 minutes, after which the print is laid face up on an inclined board and dried with a non-linting blotter.

Making Ammonium Oxalate. Make up a saturated solution of oxalic acid (poison) in hot, distilled water. Add to this, *gradually*, powdered ammonium carbonate, stirring well, until all efflorescence ceases. Keep the solution hot, but not boiling, during this operation—about 180° Fahr. Place the solution aside for twelve hours, when half or more of the liquid will be found to be crystallized. These crystals consist of ammonium oxalate, which, when dried upon clean blotting paper, gives the salt commonly used in making up the oxalate developer.

To Prepare Ferrous Oxalate. Prepare two solutions as follows: *A*: Dissolve 2 pounds proto sulphate of iron in 2 quarts of distilled water. *B*: Dissolve 1 pound of oxalic acid (poison) in 2 quarts of warm water. Filter each solution before mixing. When both salts are completely dissolved, add the acid solution *B* to the iron solution *A*, stir well with a glass strip or rod and allow the precipitate to settle for two hours. Now pour off the clear liquid, add filtered water and stir well as before. Allow to settle and then again pour off the clear liquid. Pour the residue into a strong filter paper with a wad of absorbent cotton placed over the apex of the filter, and wash this twice by pouring filtered water on the precipitated residue. Allow this to stand twelve hours, then open the filter paper upon

a thick blotting board and let the mass dry spontaneously in a warm place. Reduce to powder form, when dry, by simple pressure. The result will be about 20 ounces of pure ferrous oxalate—($\text{FeC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$).

Bromide Printing and Toning. (Womersley.) A quick and reliable method for producing contact or enlarged bromide prints. Give correct exposure, tending to very slight over- rather than under-exposure. Make up the following developer immediately before use: Amidol, 20 grains; sodium sulphite (crystals), $\frac{1}{2}$ ounce; water, 20 ounces. Correctly exposed prints will fully develop in this developer in $2\frac{1}{2}$ minutes at normal temperature of 65° Fahr. Examine prints by looking through at an orange light screen—a good print will be vigorous in contrasts and plucky throughout. One ounce of this developer will be needed for each 5×7 print. Rinse prints after development and immerse immediately in a fixing bath made up as follows: Dissolve 10 ounces hypo in 100 ounces of water, and add 4 fluid drams acetic acid No. 8. Leave the prints in this fixing bath at least 10 minutes, being careful not to let them lie one on top of another. Wash thoroughly in three changes of water, separating the prints and giving at least three minutes washing between changes. Immerse in a bath of hypono, 1 ounce; water, 100 ounces. This kills all the hypo remaining in the prints. Again wash in three changes of water; and transfer to a bleaching solution made up as follows: Potassium ferricyanide, 2 ounces, dissolved in 50 ounces of water; then add potassium bromide, 2 ounces, dissolved in 30 ounces of water. After thorough mixing make the bulk of the bath up to 100 ounces. This can be used repeatedly if well filtered after each use. When thoroughly bleached in this, wash the prints in three changes of water and tone them in ammonium sulphhydrate (sulphide) $1\frac{1}{2}$ ounces, dissolved in 20 ounces of water. This gives a pleasing brown tone and the prints do not fade.

Permanganate Bleacher. (Ireland.) The following bleaching bath is advised for beautiful sepia tones on bromide paper. Develop, fix and wash prints as usual. Prepare the permanganate solution as follows: Pot-

assium permanganate, 240 grains; water, 20 ounces. This forms a stock solution. For use, take $\frac{1}{2}$ dram of the stock solution, add $\frac{1}{2}$ dram hydrochloric acid, and 10 ounces of water. In this bath the print is immersed and rocked until the image completely disappears. If more energetic action is desired in any part of the print, add $\frac{1}{2}$ dram of the permanganate solution to 2 ounces of water, and add this to the bleaching bath in small quantities as needed. Wash the print for 5 minutes in running water and immerse in any good sodium or ammonium sulphide bath, such as that given in Womersley's method above.

Red Chalk Effects. Bromide and gaslight prints which have already been toned by the sodium sulphite and hypo-alum methods, will take a pleasing red chalk tone (varying in richness and depth with different brands of paper) by immersing them in the following bath. Dissolve 40 grains ammonium sulpho-cyanide in 18 ounces of water. Next dissolve 4 grains gold chloride in 2 ounces of water. Add the gold solution, with constant stirring, to the sulpho-cyanide solution and set aside for an hour to ripen. Immerse the prints in this bath and keep them moving until the desired tone is secured. Remove the prints, wash for a few minutes only, and fix in a solution of hypo 3 ounces, water 16 ounces for 3 minutes. Finally, wash for 15 minutes and dry.

Development of Gelatine-chloride Prints. A time-saving method of obtaining proof prints on gelatine print-out paper in winter or dull weather, is to develop the faintly printed proof in a solution of 20 grains metol in 20 ounces of water, to which 120 drops of acetone have been added. This gives the standard gold-toned color. The development should be done in a yellow light, and the prints are immersed dry in the developer, without preliminary washing. After they have reached the desired tone, immerse in a bath of acetic acid, 1 dram, to 40 ounces of water for three minutes, washed, and fixed in the usual hypo bath employed for print-out papers.

Stains in Sulphide Toning of bromide and gaslight prints can almost always be avoided by ensuring that

the hypo fixing bath has free access to all parts of the prints when first placed in the solution. If the prints are allowed to adhere to each other, or bubbles are permitted to form on the surface of the prints, during the first few minutes' immersion, a compound is formed which further fixation does not change or remove, and this is generally the cause of the blue stains and streaks in sulphide-toned prints.

Failures in Sulphide Toning. (Rajar.) In order to produce the best results in sulphide toning it is necessary to pay particular attention to the following points:

(1) Prints should be correctly exposed, so that in development they reach the full depth in the usual time. "Forcing" is not only useless, but sometimes causes fog.

(2) The fixing must be thorough, preferably in two separate baths, and the washing must also be thorough.

(3) The sulphide solution used must not be too weak.

(4) Prints should not be left in the sulphide bath a moment after they reach the full tone.

(5) On removal from the sulphide bath, the prints must not be allowed to stick together in the washing water.

We give below a list of the principal failures likely to be met with and their causes:

A. Loss of detail in the halftones. This is caused by the hypo not being thoroughly removed in washing after fixing.

B. Degraded whites and local stains. These are generally caused by "forcing" in development, by insufficient fixing, or by omitting to keep the prints on the move during fixing.

C. Blue spots. These are usually due to particles of iron in the washing water; and can generally be prevented by tying on the water tap a bag made of swansdown or similar material.

D. Yellowish tones. These are caused by the prints being over-exposed and not fully developed; also by the use of old or decomposed sulphide.

The sulphide bath should not be weak—in fact, it can be rather on the strong side, but not strong enough to cause blisters. By dissolving four ounces of sodium sulphide in twenty ounces of hot water, we have a con-

venient stock solution, from which a working bath can be made by taking three ounces of this stock solution and diluting it with twenty ounces of water.

We sometimes hear of one make or grade of paper being perfect for sulphide toning, whilst another is condemned as useless; but photographers should remember that all gelatines do not possess the same degree of permeability, and therefore a hard surface paper may require a longer time in the fixing and washing.

Barium Sulphide as a substitute for sodium sulphide in the toning of bromide prints is suggested by Rajar. The toning solution is made up by dissolving 2 drams of barium sulphide in 20 ounces of water, which is used after the usual ferricyanide bleaching bath, works at about the same speed, but gives rather colder tones than sodium sulphide. Barium sulphide has not as unpleasant a smell as the sodium, neither does it attack the gelatine film, and the solution may be used repeatedly. If the barium solution gives a whitish scum or deposit on the prints, rather difficult to remove, this is due to the presence of sulphates or carbonates in the local water supply and distilled water should be used.

Saving an Over-exposed Bromide Print or Enlargement. Soak the print or enlargement in water for a few minutes before development. Drain water away and apply a diluted developer, say, 1 part normal developing solution to which 2 parts water have been added. As soon as the image begins to appear, immerse the print in plain water again, when the image will gradually build up until full detail is obtained. At this point transfer the print to a clean tray and flood quickly with normal strength developer. This will give the print vigor and brilliancy. When this is secured, transfer the print quickly to the "stop" bath, after which fix and wash as usual.

Strengthening Weak Bromides. Dissolve 50 grains potassium bichromate in 10 ounces of water, and add 10 minims pure hydrochloric acid. Bleach the weak bromide print in this until all trace of yellowness has disappeared from the highlights, doing this in very

weak daylight or artificial light. Now rinse the print in water and re-develop in any amidol developer advised for bromide prints. Development proceeds slowly, but without stains or streaks. When fully developed, wash for 5 minutes. No fixing is necessary.

Saving Over-printed or Dull, Heavy Bromides. Dissolve one dram of iodine in 2 ounces of water, adding just sufficient iodide of potassium to effect solution. This gives a dark brown tincture. To clear bromides which have been slightly over-printed or over-developed, or are dull and heavy in effect, place the prints in a tray with just sufficient water to cover them, and add a few drops of the iodine solution, sufficient to give a sherry color, which indicates a suitable strength. The prints should be immersed two or three at a time and kept moving until the paper turns a deep blue and the highlights of the image show a pale blue. The prints are then rinsed in water and transferred to a fixing bath made up of 3 ounces of hypo to 20 ounces of water. The blue color is instantly discharged and the print gains in contrast and clearness. Washing the prints in several changes of water for 20 minutes completes the process.

Prints on Vellum Papers. The preparation of Vellum-surfaced, toned papers, such as Japanese Vellum or Whatman's Photographic Vellum, is described by A. J. Jarman, as follows: Make up the following albumen salting solution; be sure to use distilled water: Chloride of ammonium, 120 grains; chloride of sodium, 120 grains; distilled water, 30 ounces. Shake the mixture until the salts are dissolved; now make up the following: The whites of three eggs, equal to 3 ounces; distilled water, 3 ounces.

Beat this mixture into a well-broken-up mass for five minutes with a silver-plated dinner fork (the ordinary tin whisk egg-beater must not be used for this work). When the mass has been well beaten pour it into the salting solution, in a wide-mouthed bottle, and shake vigorously, so as to secure thorough incorporation. Allow this mixture to stand for twelve hours, then filter through a double thickness of wetted cheesecloth, and secondly through a tuft of wetted absorbent cotton.

The salted mixture must now be poured into a clean tray, and the sheets of paper carefully floated upon the surface for three minutes. Occasionally lift the paper by one corner to ascertain that no air bells are formed; if they are, use a quill camel's-hair brush, dipped into the salting mixture, and wipe over the spot, then return the folded paper to the solution. At the end of three minutes lift the paper from the solution and let it drain cornerwise over a glass funnel, where it must be suspended by two clean wood clips upon a stretched line to dry, away from dust and dirt.

When the paper has become thoroughly dry, mark the back of the sheet with a black lead-pencil. Roll the paper upon a cardboard tube, face *outward*, always using a pair of clean white cotton gloves when this is being done, to prevent the fingers from touching the surface. Paper thus salted will keep any length of time before sensitizing.

Having a number of sheets prepared, make up the sensitizing solution as follows: Distilled water, 30 ounces; recrystallized nitrate of silver, 4 ounces; citric acid (crystals), 1 ounce. The nitrate of silver can be dissolved in twenty ounces of water, the citric acid in ten ounces; then add the acid solution to the nitrate of silver, shake the mixture well; then, filter it through a tuft of absorbent cotton, in a glass funnel. The sensitizing solution is now ready for use.

Sensitizing the Paper. Pour the acid silver solution into a clean porcelain or glass tray, in a room lighted by yellow light only; place upon the surface of the liquid one of the sheets of salted paper, the salted surface upon the liquid, holding the paper by opposite corners, so as to allow the middle to touch the liquid first, then lower the ends. By this means no air bells will be formed. Allow the paper to remain upon the liquid for 3 or 4 minutes when it may be lifted and drained from one corner; allow the drippings of silver solution to fall into a glass funnel placed in a wide-mouthed bottle. These drippings can be returned to the original solution and filtered again for use. As soon as the paper is perfectly dry it may be rolled up or cut into the sizes required.

The sensitizing solution will become slightly discolored after use; this will not affect the sensitizing qualities. The paper prepared as above will keep well for many weeks.

Palladiotype Paper. The developing and clearing baths needed for the new matt surface variety of this paper are made up as follows: Water, 20 ounces; citrate of soda, 2 ounces; citric acid, 100 grains. This is the developer. For the clearing bath the quantity of water in the formula should read 40 ounces. After development, palladiotype prints should be placed in three separate changes of clearing solution, for about 10 minutes in each bath. The last bath should be free from any coloration. Finally, wash the prints in running water for 15 minutes and dry between blotters. With weak negatives the addition of a very small quantity of bichromate of potash to the developer results in greater contrast in the prints, but if the bichromate is in excess, the highlights of the picture will suffer.

THE WORKROOM

Stripping Negatives for Storage as Films. (Fishenden's Method.) Cut the gelatine film through to the glass, close to the edges of the negatives, with a sharp, rigid knife giving a clean, perfect cut. Immerse the plates in commercial formalin for 10 or 12 minutes, a grooved tank being most convenient for this soaking. Transfer, a few at a time, to a vulcanite bath containing formalin, 25 ounces; hydrofluoric acid, $\frac{1}{2}$ ounce, and leave the plates in this for 30 seconds. Rinse under the tap and strip off the narrow edges of gelatine film, then set them in a flat tray in gently running water for a few minutes. The films are now ready for stripping. Lay a negative, face down on a sheet of tough bond paper previously wetted by soaking in water. Squeegee the paper and negative film into absolute contact, using a flat squeegee. A corner of the film is now lifted with the tip of a knife blade, and the whole film, on its paper support, will easily come away from its glass support without stretching or distorting. Now lay the film, face down, upon a sheet of glass which has been

cleaned and polished with French chalk as for glazing prints. When the film has been thus transferred, the paper is carefully stripped away, and the film, on its new support, is left to dry spontaneously in a current of warm, dry air. Old negatives, which may have been handled with greasy fingers, should have their film surfaces well rubbed with benzene, applied with a tuft of cotton, before this process is attempted.

Dry Stripping. (Sterry's Method.) First prepare a "loosening" solution as follows: Potassium carbonate solution (50 per cent), 1 ounce; glycerin, $\frac{1}{2}$ ounce; formalin, $\frac{1}{2}$ ounce; cold water, 25 ounces.

The negative is immersed in the above for about forty-five minutes. This is the average time; some plates will need a longer and some a shorter soaking. The plate is then drained, wiped free from surface moisture with cotton or chamois, and put aside in a place free from dust to dry.

A solution of gelatine is next made by soaking a little gelatine in cold water and dissolving by heat. This gelatine is to give body to the negative film when it is stripped. Therefore, the stiffer or thicker the gelatine solution the more body in the film. The body also makes the film easier to handle. When the gelatine is melted the solution is poured and spread rather thickly upon the negative, which is afterwards set aside in a perfectly horizontal position to dry. When quite dry a cut is made through the film by means of a sharp penknife, about one-eighth of an inch all around, after which one corner of the film may be lifted up and the whole stripped from the glass very easily. One thus strips a dry negative and gets a film negative from it.

Dry Mounting Plates are apt to deteriorate in use. The surface becomes defaced by protruding pieces of tissue, dented, or tends to produce a shiny spot in the center of the print. It has been advised to restore the surface by first rubbing down until all the marks are obliterated and the plate has a perfectly even, hard, glossy surface. If a semi-matt finish is desired, the plate is then polished with a fine knife-polish or pumice powder. If a matt surface is required, the plate is placed in a bath of sulphuric acid and etched for about

a quarter of an hour—or until the desired surface is attained. Better than this tedious plan, however, is the suggestion of Charles H. Davis, to discard the plate altogether and use in its place a sheet of heavy-weight cover-paper stock, thoroughly dry, with a hard, smooth surface. This is renewed from time to time as needed.

Mounting Without Cockling (H. Allen). Where a print is mounted by its four corners only to a sheet of paper or thin card, any cockling of the mount can be prevented almost entirely by the following very simple plan: The print is first laid upon the mount in the exact position which it is to occupy, and a pencil dot is placed to indicate its four corners. With a sharp knife and a straight edge as a guide, two clean cuts are made diagonally across the area so marked out on the mount, approaching the pencil dots to within about a quarter of an inch or more, according to the size of the print. The print is then mounted by its corners, being left under gentle pressure until thoroughly dry. The cuts allow a little play for the mount, and let it adapt itself to the tension put on it by the print. They may be hidden by means of a second mount when adopting a multiple mounting system; but, in my own case, I generally attach a second mounted print to the first, back to back.

Dry-Mounting Panoramic (Section) Prints. To avoid the thin line of mount showing between sections, due to a slight shrinkage of prints in dry-mounting, the following method is recommended: The prints are first slightly warmed to shrink them as much as possible, then tissued, and the print at the left-hand end of the set then taken in hand. From this a strip is trimmed from the right-hand end side at right angles to the horizon, if the picture contains one, or parallel with any upright lines, if it is an architectural subject. This print is then adjusted on to the next one, so that the subject appears properly joined up (if there is a horizon it must continue in the same straight line), and the second print is trimmed close up to the first with a knife and steel straight-edge. It helps to get a close join if both prints are cut through together at this stage.

The remaining prints of the set are then matched in the same manner, but only sides which come against other prints are trimmed now, the other sides being left till later.

The next thing is to take a piece of thin, tough paper a little larger than the complete set will be, and very slightly damp it by holding it in the steam from a kettle of boiling water. The object of this is to expand it slightly, and although too much moisture will ruin the prints, the amount actually required is infinitesimal. The prints are then attached to this sheet with the mounting iron in the usual way, taking care to butt each one close up to the next, and fitting the detail correctly. The whole is then given a good pressure in the mounter, and on removal it will be found that joins are scarcely visible, the slight contraction caused by the damp paper drying having drawn all the prints tightly together.

Dextrine Paste Mountant. (R. S. Browne.) Take: White dextrine, $2\frac{3}{4}$ pounds; water, 64 ounces; oil of winter-green, twelve minims; oil of clove, 12 minims.

Bring the water to 160° Fahr. and stir the dextrine in slowly, taking care not to allow the temperature to vary more than one degree either way until the dextrine has dissolved to a perfectly clear solution. As soon as the dextrine has passed into solution, add the essential oils slowly, stirring all the time. After this has been done, allow the solution to cool, and then pour it into bottles and cork. These bottles must then be set aside for a week or two to permit the paste to congeal. As soon as the paste "sets" it will have a perfectly white color, and will possess the firm consistency which is characteristic of library paste. In order to use it, it is necessary to add a little water and work it around with a brush.

In preparing this paste care should be taken to use the best grade of white dextrine. The whole secret of the process of manufacturing is in maintaining the temperature at 160° Fahr. At this temperature the dextrine undergoes certain peculiar molecular changes, and any serious variation from it results in a very inferior product.

Flattening Glossy Prints. No trouble should arise

with ferrotyped prints either on single or double weight paper if proper care is given to prints after finishing. Prints should not be removed from plates and then left to lie about subject to variation in atmospheric conditions, as the first tendency of all glossy gelatine paper is to curl after removal from ferrotype plates. In fact, no gelatine prints should be allowed to remain scattered loosely about, as they will curl more or less by contraction and expansion of the gelatine surface under the same variable conditions.

Ferrotyped prints should be trimmed, if necessary, and placed at once under pressure for a few hours, or until required for delivery. At times it may be found advisable to bend the prints slightly backward by drawing face up over edge of table on removal from plates before putting under pressure, taking care to avoid cracking the surface. Another good plan is to dampen the back of prints with alcohol and place face down between cardboards under pressure until thoroughly dry.

Spots on Squeegeed Prints can be prevented by taking care to have plenty of water present when the print is put down upon the talced glass or ferrotype plate, putting it down so as to exclude air-bells, and by careful squeegeeing. To put down a print as mentioned it is held by two opposite corners, so as to form a loop; the bottom of the loop, which will be a diagonal of the print, is brought into contact with the water on the ferrotype, and the hands are then lowered so as to bring the different parts of the print in contact in succession. If any air-bells were on the print this would drive them towards the edges, and so out. Glass has the advantage when squeegeeing that one can look at the print from the other side and make sure that there are no air-bells.

Economy in Ferrotype Plates. Much of the expense attaching to the use of ferrotype plates for glazing prints in commercial studios where quantity production prevails, is due to the accidental injury or defacing of the plates. Much of this can be avoided by backing up the sheets and providing means for keeping them out of harm's way, both while in use and when put away. I have found a good way of doing this to be to mount each sheet on a board, which provides an inch of mar-

gin all around the ferrotype. The board is provided with a ring at one end, by which it can be hung up on the wall while the prints are drying, while at each corner, on the same side as the ferrotype, is placed a brass-headed nail. These nails allow the boards to be stacked up together without anything being in contact with the surface of the ferrotype itself.

Drying Large Prints. The method commonly employed is to place the prints back to back and suspend the pair on a line by means of the wooden clips so generally used in photography. Sometimes, however, large prints saturated with water, cannot be suspended in this way, the narrowness of the jaw or grip of the clip not offering sufficient purchase on the soft, heavy prints. To remedy this, cut away the inner and curved sides of the jaws of the clip, and so make room for two narrow strips of thin wood cut from a cigar box—about 3 inches in length and $\frac{1}{2}$ inch in width. These are attached to the jaws of the clip with brass screws and increase the gripping area of the clip sufficiently to hold the largest print. (Godfrey Wilson.)

Encaustic Paste. If this paste is well rubbed into large sepia bromide prints or enlargements, the prints being subsequently polished by rubbing the surface with a soft cloth, they can be given the dull finish peculiar to a sepia carbon print. Purified beeswax, 500 grains; oil of lavender, 300 grains; benzol, 300 grains; gum elemi, 10 grains. This mixture should be well stirred with a strip of hardwood until a smooth mass is obtained.

Drying Negatives in Winter. Follow the last washing of the negatives with immersion for three minutes in a bath made up of commercial formaldehyde, 1 part to 9 parts of water. Remove all excess of water from the film and glass sides of the negatives with a very soft, smooth sponge or piece of chamois, and set the plates to dry, not too close together, in a drying rack placed in a current of warm, dry air, as in an ordinary living room. The use of the formaldehyde bath will permit the negatives to be dried quickly over the heat ascending from a radiator where speed is essential, but the rack drying as advised is to be preferred where time allows.

Opaque. Mix the following in the inner vessel of a double boiler or oatmeal kettle: Yellow dextrine, 8 ounces av.; cold water, 15 fluid ounces. When thoroughly mixed, heat this to boiling in the outer vessel of the kettle, stirring vigorously for thirty minutes. As soon as the dextrine is thoroughly dissolved add 3 drams of formaldehyde, stir again for a few minutes and allow to become cold. This constitutes the syrup of dextrine which is used as a binder for the coloring matter of the opaque.

To prepare the opaque, take red lead, 10 ounces av.; lampblack, $1\frac{1}{2}$ ounces av., and mix them thoroughly in the dry state. Now work the mixture into a stiff paste with 3 ounces of hot water and add to this 6 fluid ounces of the dextrine syrup above. Stir well and then strain the mixture through a double thickness of very fine cheese cloth. Allow it to stand a few hours to rid the mixture of absorbed air when it is ready for use. Store in jars or wide-mouthed bottles of convenient capacity.

Quick Coloring for Large Prints. Where quantities of enlargements are to be colored for use as theatrical or advertising posters, the following method will be found useful as simple in manipulation and effective in result. Make up a wax medium, consisting of white beeswax, 1 ounce; potassium carbonate, 24 grains; water, 2 drams; turpentine, 2 ounces. First melt the wax in a jar placed in a pan containing water to half the height of the jar, using gentle heat. Dissolve the carbonate in the water and add to the melted wax with constant stirring to secure a smooth mixture. Remove the vessel from the heat and add the turpentine, stirring until the mixture has the consistency of cream. If too thick, add a little more turpentine. Before it is quite cool, pour this mixture into a wide-mouthed bottle—ready for use. The powder colors used with this medium are best obtained by crushing soft pastels of the colors needed on a glass or china plate. To apply the color, moisten with the medium to a fine, smooth paste, and rub it into the print with a piece of soft, fine linen stretched over the forefinger. For fine details, the linen is stretched over the end of a small leather

stomp, or thin transparent tints are applied with a small brush. The finished print may be sprayed with pastel fixative to prevent rubbing.

Water Varnish. Powder 1 ounce bleached shellac and allow it to digest for some hours in a mixture of 2 ounces of strong ammonia and 2 ounces alcohol, then place the bottle in a vessel containing warm water and shake it occasionally until complete solution is obtained, when water is added to make the bulk of the solution up to 8 ounces. This varnish may be applied to wet or dry negatives or transparencies. Films should be immersed and then suspended to dry. For prints apply with a brush or fine sponge and hang up to dry. Suitable for any purpose where a spirit or celluloid varnish cannot be used.

Ground Glass Varnish. Dissolve sandarac, 90 grains, and mastic, 20 grains in 2 ounces ether (9.720), and add $\frac{1}{2}$ to $1\frac{1}{2}$ ounces benzole, according to the fineness or character of the matt surface desired.

Crystal Varnish. Dissolve 250 grains gum dammar in 10 ounces benzole. Apply cold. A mixture of 120 to 130 grains celluloid shavings dissolved in 16 ounces of amylacetate is equally effective.

Cement for Fastening Glass to Metal. Soak a small quantity of gum arabic in water for twenty-four hours or until it gives a solution of about the consistency of thin molasses. To this, using a glass plate as a mixing slab, and a spatula, sufficient calomel is added and worked into a cement. As the sticky mass so formed hardens within a few hours, only sufficient for immediate use should be prepared.

Cement for Films. When it is desired to assemble and fix a number of films on a sheet of plate glass for printing, a suitable cement for this purpose is made of a mixture of gelatine and acetic acid. If the acid is slightly warmed, it will take up an equal weight of gelatine. Should the cement so obtained be too thick for convenient use, dilute with acetic acid. This cement is applied to a thin strip around the edges of the film and, when tacky, the film is firmly pressed and held for a few moments in position on the glass plate. To detach the films after printing, insert a thin, hard steel knife

blade carefully between the film and the plate with a quick lifting motion to sever the contact.

Cement for Porcelain Trays. Soak ordinary glue overnight in water and pour off any excess water then remaining. Melt the glue by standing the container in a pan of boiling water. Ascertain the weight of the glue solution and add one-tenth its weight of powdered potassium bichromate with constant stirring. Maintain the mixture at a good heat, with frequent stirring, until the bichromate salt is completely dissolved and a homogeneous mixture is obtained. Apply this cement while warm to the parts of the tray to be repaired, hold the surfaces thus cemented firmly together, or bind together with twine, if possible; wipe off the excess of glue exuding from the joints and set aside in sunlight for a few hours to dry. Exposure to light is essential to the hardening of this cement.

Cement for Celluloid Articles. Dissolve 2 parts shellac in 4 parts of alcohol and add 3 parts spirits of camphor. This is a highly inflammable mixture. Solution is best obtained by the use of a warm bottle or container and frequent shaking in its preparation. Keep the mixture well corked when not in use.

To Repair Vulcanite Trays. Coat the broken edges with rubber solution, press firmly and cleanly into contact, and then place a strip of vulcanized fiber on either or both sides of the break to hold the pieces together. Warm the tray to 70° or 80° Fahr. before making the repairs, as vulcanite is brittle at lower temperatures.

Saving Silver Wastes. With silver now selling at over \$1 per ounce, the saving of silver wastes from spent hypo baths and spoilt or discarded (unfixed) development papers, trimmings, and scraps, is well worth the photographer's attention. The following methods are simple and inexpensive.

As to the paper wastes, these should be collected by means of a stout sack or bag, suspended in a convenient corner of the printing room. Into the sack every sensitive paper clipping, from unexposed, exposed, and developed paper should be gathered, with any spoilt sheets of paper, etc. When several sacks full

of clippings have accumulated, they should be sent to a silver refiner for reduction or the recovery of the silver. Or the contents of the sacks can be reduced to ash by burning if the photographer can provide a suitable incineator for this purpose. The fine paper ash so obtained is then sent to the refiner.

For the recovery of the silver from "worn-out" or spent hypo solutions there are several methods. The old method, widely used in its day, was to pour all spent hypo solutions into a large barrel such as a wine barrel, located out-of-doors convenient to the printing room. The barrels used for this purpose should be fitted with two wooden stopcocks, without any metal parts whatever. These should be soaked in melted paraffin and inserted in the barrel above each other, the first about 12 inches from the bottom of the barrel and the second 6 inches above the first. Into this barrel, then, all the spent fixing baths are poured, instead of being thrown down the sink as usual now a days. About 2 quarts of a standard solution of sodium sulphide are added to the contents of the barrel. This causes the silver in the solution to be thrown down at the bottom of the barrel in the form of sulphide of silver, time being allowed for this change and subsidence.

The depth of the precipitate or silver sulphide sludge thrown down can be ascertained at any time by turning the first or lower tap. If the liquid runs off clear, without muddy sediment, then the sludge has not yet been thrown down sufficiently and more time must be allowed. Frequently, however, the fairly clear solution must be withdrawn from the barrel by the second or topmost tap, to permit of the addition of more hypo solution. When the sludge has reached a depth of say 6 or 10 inches or so, it should be scooped out with a saucepan or similar vessel and poured into a clean canvas bag in shape like a pillow case. This is suspended over a second, smaller barrel and allowed to drain until it reaches the consistency of stiff putty, when it should be thrown out into a wooden tray to dry, collected in this dry form in convenient quantities and sent to the silver refiner, who will send you his check to the amount of silver recovered from this dried sludge. This method

is thoroughly efficient for its purpose, but the process gives off a most unpleasant odor. As the fumes of sodium sulphide are ruinous to sensitive photographic materials, the waste barrels should be kept out-of-doors.

The second method, which follows, is new as far as my experience goes, but has proved altogether dependable, gives no trouble or offensive odor, and ensures a larger recovery of silver than any other method I have known. In this method the precipitate is thrown down in the form of metallic silver in a very fine state of division, hence it is very valuable, bulk for bulk, when compared with the sludge or precipitate given by other methods. It is also very rapid in its action, the precipitation of a large volume of hypo solution occupying not more than twelve hours.

The Residue. In this method the spent hypo solutions are thrown into a large, clean barrel as before and a number of strips of zinc are suspended in the hypo solution from the top of the barrel; this done, all the used or discarded developing solutions of the studio are added to the contents of the barrel day by day. By this method decomposition is at once set up and the metallic silver is precipitated in the form of a fine gray mud, together with a small percentage of gelatine. The process is cleanly and involves no more trouble than simply providing a sufficient number of barrels, pouring into them the spent hypo and developing solutions day by day, stirring now and again to wash the silver sludge from the suspended strips of zinc.

It may be surmised that the action which takes place is analogous to that of the developer upon an exposed plate or paper print, viz., the silver is reduced by the liberation of the haloid, either bromine, chlorine, or iodine in the solution, and is thrown down in a metallic state. The deposit so obtained is removed from the barrels from time to time, drained and dried as described for the first method, and sent to the silver refiner. As an approximation of the recovery possible by this method, I may state that $1\frac{1}{2}$ gallons of spent hypo solution yielded 40 grains silver chloride, equal to over 26 grains of pure silver from the $1\frac{1}{2}$ gallons of hypo "waste."

Notes and Comment

An explanation is due the readers of *THE PHOTO-MINIATURE* concerning the grievous irregularities in the publication of the magazine. This is caused solely by (1) the difficulties involved in securing, once every thirty days a monograph dealing interestingly with any subject of current photographic interest, and (2) the unending delays and difficulties in the printing and publishing of magazines at the present time. Facing these conditions, I must ask the good will and patience of those for whom the magazine is made, with the assurance that they will get their copies of *THE PHOTO-MINIATURE* just as quickly as I can get the issues through press.

By an unlooked-for stroke of luck The New York Camera Exchange, 114 Fulton Street, New York City, has secured a consignment of The K-B Motion Picture Camera at a price which enables this well-known house to offer these cameras at a remarkable price concession. The K-B Camera is made by Barker Brothers, of Los Angeles, Cal., is thoroughly well constructed, uses standard film and is in every way an excellent instrument. While the consignment lasts it is offered, without lens, in natural mahogany finish at \$25; leather cover at \$30; and in aluminum, at \$35. The "Pocket Manual of Motion Picture Photography" telling how to use the camera in taking pictures and the development, drying, printing, and titling of films accompanies the camera.

In *THE PHOTO-MINIATURE* No. 171, the various methods of retouching and improving negatives were very fully discussed with practical methods and formulas. A significant paragraph preceded the methods

given, with suggestions as to the ways and means by which the reader could minimize or eliminate the need for retouching. Since that little book was written there has appeared an ingenious device, called The Artograph Screen, obtainable at a nominal price, (from The Artograph Screen Company, 500 Fifth Avenue, New York City), which practically does away with the necessity of retouching. This screen has proved itself most effective and successful in results. It is used and endorsed by many prominent professional photographers, and will undoubtedly prove a boon to professionals and amateurs interested in portraiture. A descriptive circular and specimen photograph showing the work of the screen may be obtained on application to the makers.

The readers of THE PHOTO-MINIATURE get their satisfaction out of the magazine in all sorts of ways. Thus a reader in the west writes to Miles Greenwood, a specialist in developing, printing, and enlarging for amateurs, that the quality of the service given by Mr. Greenwood has more than repaid him for his subscription to THE PHOTO-MINIATURE! Those who desire prints or enlargements from their negatives, as good as they could make them for themselves, but who have not time for this, will do well to take the hint and get Mr. Greenwood to do the work for them. I cannot recommend his services too highly.

TOCH BROTHERS, 320 Fifth Avenue, New York, have sent me a sample of Metol-Toch, an American-made metol which they are introducing. The two or three tests which I have given Metol-Toch in combination with hydroquinone for roll films and development papers, using standard formulas, prove that the new product is fully equal to the imported metol, although Metol-Toch is offered at about half the price of the imported article. Those interested should write to the makers for a descriptive circular of their product.

The three numbers of THE PHOTO-MINIATURE SERIES, which have dealt with various phases of commercial photography, being out of print, it is interesting to note that Mr. Frank V. Chambers is publishing in his "Bulletin of Photography" a series of illustrated papers entitled "The Commercial Photographer" by L. G. Rose, an expert specialist in this sort of work. The "Bulletin of Photography" is published at \$2 per year (weekly) at 210 North 13th Street, Philadelphia.

Every man loves a bargain and the amateur photographer is especially keen in the matter of bargains. The David Stern Company, 1029 Madison Street, Chicago has just published a Bargain List which is well calculated to enthuse even the keenest of bargain seekers. This list must be seen to be appreciated.

AN INGENIOUS DEVICE. Mr. Alfred Freeman, of Colorado Springs, Colorado, sends me a note concerning his new invention, the Optical Divergence Determiner for Cameras. This is a fearfully formidable name, but the thing itself is simple in use and very effective in result. The device is attachable to any small hand camera and has for its object the preservation of the correct linear perspectives of the subjects included in any view. It also gives perfect control over the space composition of any subject, indoors or out-of-doors, that is, the foreground, middle distance, and sky, while buildings or groups coming within the picture outlines can be spaced with the same nicety upon roll films, in cameras without a focusing screen attachment, as can be done with the view camera fitted with the usual focusing screen. The invention is noteworthy as supplying a missing link in the development of the roll-film hand camera and as offering further assurance of success in picture-making. I hope to give a detailed description and illustration of the O. D. D. in a later issue.



HOME PORTRAIT
Charles H. Davis



THE SUN-DIAL
Charles H. Davis



HOME PORTRAIT
Charles H. Davis



HOME PORTRAITS
Charles H. Davis



MISS ETHEL NEWCOMB
Charles H. Davis



GROUP COMPOSITION

Charles H. Davis



OUTDOOR PORTRAIT GROUP
Charles H. Davis



THE BOUDOIR CAP
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Home and Garden Portraiture

Writing in these pages less than fifteen years ago, Mathilde Weil, a pioneer among the host of women now engaged in home portraiture as a profession, observed with truth that: "Portraiture, whether at home or in the studio, is rarely attempted except by professionals, and the mass of amateurs are, as a rule, utterly unconscious of the possibilities of pleasure and profit which it places within their reach." Since that time, however, so marked has been the development of interest in this specialty, that it is debatable whether the total output of the professional studio today equals in volume the portraiture done in and about the home by amateurs and professionals combined, and it cannot be denied that the work of amateurs in this field surpasses the professional product as far as quality is concerned.

This startling change, the result of a steady growth in the appreciation of portraiture, was inevitable in the nature of things. Just as personality is the supreme interest in life, so the portrait, as a human document, is supreme in its interest as expressive or interpretive of personality. The possibilities of photographic portraiture, whether as an art or avocation, are today seen to be within the reach of all who will master the use of light and of the camera. Once these are known, as the painter and etcher know their tools and media, then the photographic process puts into the hands of ama-

teur and professional alike, methods of recording, interpreting, or expressing human personality at least equal to those of any other of the graphic arts. Aforetime this was not perceived, or at least not generally understood. As Miss Weil pointed out: "The professional photographer was confined by the conventions and traditions of studio methods, and there was among amateurs a total misconception of the scope of the camera, coupled with a widespread belief that portraiture demanded the complicated equipment and conventionalized methods of the professional studio."

I like to think that THE PHOTO-MINIATURE has had some small share in bringing about this significant change of viewpoint concerning home portraiture. My correspondence tells me of many workers, here and abroad, who are successfully following this home-craft as a means of livelihood, on knowledge and information gained from these pages. And innumerable amateurs who have achieved distinction in portraiture have acknowledged their obligation to THE PHOTO-MINIATURE. Certainly no other subject has been so frequently or so completely discussed in this series. Looking over the long list of titles, I find that no less than twenty monographs have dealt, directly or indirectly, with this single topic. In the fact that these little books are out of print, and that the demand for information on the subject is still persistent, we have the justification and scope of the new adventure here begun.

**Today's
Viewpoint**

Let us glance for a moment at the diversified interests bound up in the modern conception of home portraiture. By this is here meant every sort of portraiture done outside of or away from the professional portrait studio. Thus the making of a portrait of the merchant or broker at his desk, the worker at his bench or the weaver at her loom, the sculptor or painter working with the model, a group of women at luncheon on the lawn or city roof garden, children at play in garden or playroom, a young girl deep in a novel at the fireside, or a group of boy scouts in camp, as well as the picture of grandmother or the latest arrival at a window in the home—all these and more are included in what we call

home portraiture. In short, the home portraiture of today covers the making of portraits of people wherever we find them in their normal or everyday environment, without recourse to the professional studio or the thousand and one devices and artifices used in modern commercial practice.

**An All-open
Field**

Obviously this sort of portrait-making is open to anyone possessing a camera: the beginner with the Brownie or Ansco Pocket Camera, as well as the advanced amateur with his three-hundred-dollar Revolving Back Auto or Home Portrait Graflex, or the professional with a big view camera, anastigmat or soft-focus lens, and similar impedimenta. The most satisfactory portrait I possess of a friend is an amateur's outdoor snapshot made with a 1A Kodak of the simplest type. Technically good as a photograph, it gives me all the spirited charm characteristic of the subject—and so is a good portrait. Only the other day there came into my hands half a dozen excellent portraits of Otis Skinner and his leading lady in "The Honor of the Family," made by Mr. Charles H. Davis with a view camera and $f/5.6$ anastigmat, in the little dressing-room of the Globe Theatre on Broadway, with such daylight as was available, helped out by means of a white sheet in the hands of an assistant to lighten the heavier shadows. The conditions were extremely unfavorable, the subjects were attired in everyday dress without "make up," but the portraits completely refuted the oft-repeated dictum that good portraiture is impossible with an anastigmat. In softness, modeling, balance of light and shade and general characterization, they were equal to the best studio work. Similarly, among dozens of portraits of myself, the best, by general consent, is one made by Alvin Langdon Coburn in my office, his tools an old-style view box and Smith lens of early date. I recall, too, a remarkable portrait of a remarkable man, completely interpretive of his unusual personality, made by one of New York's most discriminating portraitists with a fifty-cent portrait attachment used in place of the lens proper, instead of, as usual, supplementary to it. These are cited as showing sufficiently that por-

traiture away from the studio and its methods offers the widest possibilities to the amateur, and is not at all confined to the few who can control a studio and its complex equipment. Even to those possessing only the simplest apparatus, it offers the assurance of endless pleasure and a fair measure of success according to the thought and care put into the work. A practical knowledge of the use of light and the camera—these are the only real essentials.

It is vitally important to make a right beginning. Making portraits is vastly different from the indiscriminate "snapshotting" out-of-doors with which the amateur is familiar, and radically unlike the studio portraiture which the professional knows. As I look at it, most of the failures made by beginners spring from a false start. With many, professionals as well as amateurs, this false start is the pernicious notion that the only good and acceptable portrait is one which so closely resembles the stereotyped studio portrait as to be indistinguishable from it. If the reader harbors this mistaken idea, let him cast it aside here in the beginning as a certain source of confusion and failure.

Look directly at the problem—free from every preconceived notion. The successful or desirable portrait is one which most pleasingly portrays or reveals the personality of the subject; which gives us back, "to the life," the intimate interest or charm of the man, woman, or child photographed; or which most completely expresses our impression or interpretation of the subject. The vital element is likeness: fidelity of resemblance to the original. This is worth rereading. It sums up the essentials in portraiture and, once grasped, simplifies its practice and invests it with an absorbing interest. Character or personality is expressed by subtle variations in line and form and light and shade in the features and figure of the subject. These are reproduced in the portrait by the skilful handling of the pose (disposition or arrangement) of the subject and its illumination, based, of course, upon the photographer's recognition of these subtle differences in the subject.

The studio portrait, at its best, is only an attempt at this real portraiture, made under stereotyped and conventionalized conditions, unfavorable rather than favorable to the attempt. However appropriate or necessary these conditions may be in commercial practice, they have no place in home portraiture and should be avoided rather than sought. Naturalness, simplicity, and directness in treatment and method, freedom from constraint and artificiality, these properly belong to home portraiture and should be cultivated as making for success.

The question of apparatus or equipment, as I have indicated, need not offer special difficulty. The vital thing here is to know the camera and lens in use at the moment, and especially their limitations. Some of the beginner's failures arise directly from attempting to do something beyond the capacity of his tools, or from not knowing how to provide against their lack of capacity.

Most amateurs will want to begin their home portraiture with the apparatus they already possess, and this will most often be a folding hand camera fitted for roll film. For their encouragement let it be said that thoroughly good portraits can be made with the simplest and least expensive hand camera outfit in the market. But successful work with such an equipment means that the working conditions must be favorable to the limitations or range of its capacity, and the worker should know beforehand how to provide for or overcome the special difficulties directly due to this limited capacity. Let us look at these.

The average hand camera is fitted with a lens working at $f/16$ or perhaps $f/8$. These speeds are slow as compared with an anastigmat or portrait lens working at $f/5.6$ or $f/6.3$, and mean a longer exposure than is practicable with many subjects, especially indoors. For example: under given conditions a subject may call for an exposure of four seconds with the only lens available which has a maximum rapidity of $f/8$, and such an exposure may involve certain failure from the movement of the subject. If we had a lens working at $f/5.6$, we could get a

properly exposed negative with half this exposure, viz., two seconds. In such a case the remedy is to secure sufficient illumination or so control the light conditions as to offset the lack of speed in the $f/8$ lens. This may mean a change of the location of the sitting from a room to the veranda, or the shady side of the house out-of-doors. Similarly, under like limitations, a group of two children in light clothing, looking out of a window may be possible, where a full figure portrait of a subject in dark clothing, made in a room at 8 or 10 feet from the window may be impossible. If the lack of capacity in the camera or lens is known beforehand, it can generally be provided for, hence the necessity of knowing the camera and lens with which you work. Unless the interior of the home offers at least one well-lighted room for portrait work, the reader who must depend on a lens whose rapidity is $f/8$ or less will find the shadow side of the house or the veranda more favorable to his success than an indoor location. Thus, on a fairly bright day, with plenty of soft, diffused light, exposures of one-half or even one-tenth second will give a fully exposed negative in the shadow of the house. On the veranda the exposures will run from one-half to one or two seconds, the subject being shielded from direct sky light. Out in the garden, but not in direct sunlight, the normal exposures for the time and season may be used, provided that the subject is not less than ten or twelve feet away from the camera, even with a lens working at $f/16$ or $f/11$. And here let me say, that in spite of oft-repeated warnings to the contrary, one can now and again get charming portraits of children out in the open sunlight. Care should be taken, of course, that the sun does not shine directly on the face of the subject. Of the delightful portraits obtainable out-of-doors, with the subject photographed against the light, I need not here speak. In this sort of work the chief precaution is to keep the sunlight from striking the lens, or passing between subject and camera.

The short focal length of the hand
Distortion camera lens is another disadvantage of
this type of camera for portrait work,
resulting in distortion if any attempt is made to secure

a large image of a near object, as in a head and shoulders portrait, by working close up to the subject. This distortion or lack of correct drawing or proportion in the parts of the subject is not apparent in outdoor views, for the making of which the hand camera is chiefly designed and used, where we work at a fair distance even from the nearest object in the scene. But in order to secure correct drawing or freedom from distortion in a portrait, it is necessary to work at a distance of ten or twelve feet away from the subject, and to get a fairly large head portrait at this distance we need a lens with a focal length about twice the measurement of the base line of the plate or film in use. Since the average hand camera lens rarely fulfils this requirement as to focal length, the only way to avoid distortion in its use in portraiture is to work at the right distance, viz., not less than eight or ten feet away from the subject, which will give a relatively small image, but one free from distortion, which can afterward be enlarged to give as desirable a larger image as we could obtain with the longer focal length from the same distance.

Theoretically this prohibition against
Remedies working too close to the subject in order to avoid the distortion resulting from the use of a lens too short in focal length applies with equal force to the use of a portrait attachment—or supplementary lens designed to still further shorten the focal length of the lens with which it is used. In practice, however, one can obtain very pleasing portraits with such an attachment, in which the degree of distortion can be minimized by taking care to keep all the parts of the subject as nearly in one plane as possible. A better plan, if the camera bellows draw will permit, is to extend the lens front so as to lessen the minimum focusing distance given on the focusing scale, and so obtain a somewhat larger image. This extension, of course, involves the use of a temporary focusing screen in the back of the camera, occupying the focal plane of the film or plate, and the focusing of an object at the new distance, in order to mark this distance on the base-board of the camera for use when a large image is desired. With focusing cameras fitted with a rapid rec-

tilinear lens, the enlarged image desired is more easily obtained by removing the front element of the lens and working with the rear element alone. But it must not be forgotten that this, while giving the desired greater focal length and so a larger image, reduces the speed of the lens, for which allowance must be made by increasing the exposure.

**Lack of
Focusing
Screen**

The lack of an adequate focusing attachment and ground glass focusing screen is a further difficulty in the use of a roll film hand camera for portrait work. For ordinary outdoor photography the small finder and focusing scale of the hand camera serve their purpose very well. In portraiture one works with more deliberation, and it is very desirable to be able to focus the picture image and observe its appearance on the focusing screen, to control the point of principal focus and so on before exposure. This gives one complete control over the definition in the portrait as well as the ability to see defects or opportunities for improvement in the pose or arrangement and light and shade effects, which are seen to greater advantage on the screen than in the subject itself. If the camera has a focusing device and can be fitted with a plate attachment, including the usual focusing screen, this should be done as the simplest way of adapting the camera for portrait work. Where this is not possible, the addition of a wire frame, direct vision finder of the same size as the plate or film in use will be found most helpful.

**Direct Vision
Finder**

Mention of this type of finder as a substitute for the ground glass screen in portraiture reminds me of a series of wonderfully clever portraits of children sent me by an Australian amateur a few years ago. They were about 7 x 9 inches in size, beautifully soft in definition and lighting effects, and fully exposed although obviously made in the rooms of a home. In the letter accompanying the prints I was surprised to learn that these were enlargements from $2\frac{1}{4} \times 3\frac{1}{4}$ film negatives, made with a film camera and lens with a focal length of 5 inches and speed of $f/6.5$. The photographer attributed his success to the careful use of a wire frame, direct vision

finder and accurate focusing scale which he had had fitted to his camera for use in this sort of work.

Reflex Cameras

Of the obvious advantages of a camera of the Graflex or reflecting mirror type for home portraiture it is needless to speak. With such an instrument one is able to adjust the focus and watch for the desired expression, with the full size image in view right up to the moment of exposure. For outdoor portraiture such a camera is ideal in convenience and efficiency, enabling one to follow the movements of the subject (as in the case of children at play), and in many ways secure a greater degree of spontaneity and naturalness than is possible in any formal pose or arrangement. With a lens working at $f/6.3$, such as is generally fitted to this sort of camera, successful portraits can be obtained outdoors on a bright day with exposures of 1-150th second, and indoor portraits will often be possible in one-quarter second. Indoors, almost invariably, the camera must be used on a tripod or other support, but some amateurs who have mastered the use of sunlight in a room or wide hall have obtained very desirable portraits with the Graflex supported in the hands by a strap from the shoulders. In recent years many professionals have learned to rely upon this type of camera exclusively in their home portrait work, using the small size instrument and obtaining prints of the size desired by after-enlargement.

The Favorite Outfit

The equipment most widely favored by professionals and amateurs who follow home portraiture in a serious way is an ordinary view camera of the $6\frac{1}{2} \times 8\frac{1}{2}$ or 8×10 size, sometimes fitted with kits to take 5×7 plates or flat films, with a bellows extension of from 13 to 26 inches, and the usual swing, focusing and ground glass screen attachments. There can be no doubt but that this type of outfit offers greater satisfaction and convenience in working, and by its wide range of capacity assures a larger certainty in results than is possible with the small hand camera. Thus the bellows extension permits the use of lenses of varying focal length, or of different types of lenses when this is desirable, and the focusing screen gives control of the makeup and defi-

dition of the portrait and of the arrangement and general treatment of the subject. Similarly, since the camera in home portraiture is generally used on a tripod, the bulk and size of the view camera offer decided advantages in handling, with an absence of the sense of bother and fuss one has in operating a very small hand camera and its compactly arranged attachments when fixed to a tripod. For which reasons the reader who intends to put serious effort into his home portrait work will be well advised to purchase a camera of this sort in the beginning. The Montauk Home Portrait Outfit (Gennert) is a good example of this professional equipment.

Lenses In the matter of lenses for home portraiture there is the widest diversity of opinion. It is generally admitted that speed is the one thing necessary, and yet few home portraitists mention the modern anastigmat except to condemn its use in this field. The objection, of course, is that it gives a wiry, sharp-all-over definition very undesirable in a portrait, without atmospheric effect or differentiation of planes. But this objection will not hold water if you will learn how to use the anastigmat properly. There is the suggestion that beautifully soft definition can be had with an anastigmat by means of a screen, made by stretching two thicknesses of chiffon over a light frame or ring which is attached behind the rear element of the lens, inside the camera, after the portrait has been focused and before exposure. I have proved the efficacy of this simple device, and it does not materially lengthen the exposure. Similarly, if small negatives are made for after-enlargement, it is possible to soften the image to any desired degree by any of the various methods of diffusion in enlargement. There are also several methods of diffusing the definition in direct printing from large negatives. As far as the necessity for speed is concerned, a lens working at $f/5.6$ or $f/6.8$ is generally recognized as sufficiently rapid for all purposes, and most frequently an aperture of $f/6.8$ will be used as giving a better control of the detail and delicate tones in the lights of the picture. The Tessar IC and the Goerz Celor are the anastigmats most widely used in this field.

**Single Lens:
Rectilinear** Many workers prefer a single lens working at $f/8$ or thereabouts, as having all the speed required and giving more roundness of modeling and softer definition, with a better separation of the planes than can be had with an anastigmat. In my own experience I have learned to appreciate the qualities of an old-style rectilinear, working at $f/8$, which I "picked up" second-hand for less than \$10, years ago. This gives me all the softness, plasticity, and atmospheric effects I want in a portrait, by virtue of its defects or lack of correction. When it is too slow I substitute an anastigmat, or move my subject to some other location where the illumination is more ample, or put off the photographing until the light conditions are more favorable. The lists of dealers who sell second-hand apparatus are clogged with old-style single and rectilinear lenses at very moderate prices.

**Soft-Focus
Lenses** Then there are those who swear by the soft-focus lens and can see no virtue in any other for portrait work. As to this there is much to be said in favor of a lens possessing speed (for use when really needed) and some means of varying the definition by diffusion, such as the Wollensak Verito. I have seen portraits made with lenses of this type which were beyond all praise. But the soft-focus lens needs to be known before it can be used with any degree of success, and I know of no other type which demands so much skill and discrimination in its use.

**The Beginner's
Choice** Naturally the portraits made with these various types of lenses differ largely in their qualities as far as definition is concerned. Preference among them is largely a matter of individual taste, and it would be unwise to pronounce any one of them to be superior to the rest. And, as matter of fact, one can do wonders in controlling the definition and separation of the planes of a subject by skill and experiment in focusing—which is an art in itself and one largely neglected nowadays. The beginner may well begin contentedly with the lens he has, or, if he must purchase, with a moderately rapid, moderately priced rectilinear, which he can adapt for use as a single lens on occasion, adding the more ex-

pensive and more ambitious anastigmat or soft-focus lens when he feels the need of the ultra-speed or the diffusion these lenses will give him.

Use a Lens Shade For working against the light, whether indoors or out-of-doors, by means of which many attractive lightings may be obtained, the use of a lens shade will ensure very much better negatives than can be had without it. Especially when using an anastigmat out-of-doors in a brilliant light, where the subject is silhouetted against a sunlit background and the light streams against the camera, is a lens shade necessary. The veil or light fog, or lack of crisp brilliancy observable in amateurs' portraits is generally due to this neglect to shade the lens. Where a lens shade is not available under such conditions, the photographer should stand so that his body shields the lens from direct or excess light, or one may use the hand or a hat for the same purpose. If, however, a soft veil or flatness in the tones of the portrait is sought as adding to the pictorial effect, then this advice as to the lens shade may be disregarded.

Tripods Whatever type of camera and lens be chosen, large and bulky or small and compact, a tripod must be considered as essential to the home portrait outfit. There will, to be sure, be occasions, indoors as well as outdoors, when the small hand camera with a very rapid lens or the Graflex outfit may be used with perfect success in the hand, or attached to a chair back or other improvised support. But wherever the exposure indicated exceeds one-twenty-fifth second—and it may run to ten seconds!—the tripod is an absolute necessity, saving hopeless underexposure or failure. Choose a tripod of sturdy build, which will remain steady and free from vibration when extended. The light-weight, compact metal tripod looks better and is more convenient to carry, but is uncertain and not to be depended upon in home use. For indoor work on smooth floors, a tripod truck or a set of cork or rubber tips will save many a slip and failures due to the tripod legs spreading at a critical moment. Similarly, indoors and out, a tripod brace or stay will give rigidity and security to the equipment.

Some workers advise the addition of a turntable to the camera base or tripod head as very useful in turning the camera about without having to reset the tripod; and the new focusing hood introduced by the makers of the Artograph Screen offers a complete solution of all the troubles and inconvenience due to a bulky and pestiferous focusing cloth.

**Plates
or Films**

As to the relative advantages of plates and films in home portraiture, theory and practice are in conflict. Theoretically, the big advantage swings over to film, but so much good work is being done with plates that one hesitates in saying that the one is better than the other. The amateur with a roll film or film pack camera will, of course, use films. But the man or woman with the big camera? Let us consider the problems involved. These are: the necessity of getting shadow detail with short exposures and difficult conditions of illumination when working indoors; the photographing of near objects often strongly contrasting in color; working with strong light and shade contrasts and keeping the gradation of tones and detail desirable in the high lights of the subject; avoiding halation effects even when working directly against the light, as when windows or a sunlit background are included in the composition of the portrait.

If we are going to use plates, those of the ortho or isochromatic variety, non-halation or double-coated or single-coated and backed, would seem to be indicated. But for these an adjusted light filter and the increased exposures necessitated by such filters are essential in order to secure their full advantage. And exposure is the most difficult problem of all indoor portraiture. On the other hand, in spite of theory, a well backed, ordinary plate, properly exposed and carefully developed, will often give an altogether satisfactory indoor portrait, with the advantage of extreme rapidity where this is needed. The secret of success here is to look to the balancing of light and shade in the subject, so that a full range of tones is secured in the high lights with sufficient light in the shadows to give the desired amount of tone and detail, a generous exposure, and develop-

ment with a developing solution in which the proportion of alkali does not exceed one-quarter of the normal quantity.

In the use of films we have the advantage of light weight and portability in working large sizes, with the much more important advantage that the absence of glass as a support for the emulsion eliminates the liability of halation, and the film base gives a more delicate gradation of tones both in the higher lights and deeper shadows. It is obvious that this quality is particularly desirable in facing the conditions outlined above.

With this preliminary survey of home portraiture as a special field, we can now profitably consider the working methods to be employed. In this we will first take up the making of portraits indoors, as presenting problems with which the amateur is less familiar than he is with those encountered in outdoor photography.

The faults most commonly found in the beginner's first attempts at indoor portraiture are underexposure and harsh or contrasty lightings. These lead him to the mistaken conclusion that there is not sufficient light in the average home for successful portraiture. In truth, however, these faults simply indicate that the beginner usually begins without sufficient thought (1) as to the general problem of indoor illumination; (2) of the enormous difference between the photographic power of light indoors and out-of-doors; and (3) of the big difference between the exposure required for dark objects close to the camera and that for distant objects. As the reader's success in indoor portraiture will depend very largely on his grasp of these three factors and his ability to control them, we must consider them before going further into the subject.

A practical knowledge of indoor illumination can best be had by systematic study and experiment. This may be done in one's odd half hours, preliminary to any actual work with camera and subject. Much practical information on the subject, directly applied to indoor photography, may be found in THE PHOTO-MINIATURE

No. 157: Exposures Indoors, to which the reader is referred as the only handbook of its sort. As for the practical experimentation required, I know of no method better than the persistent use of an actinometer and notebook, until the light values of every location in the home likely to serve for portrait making are known and recorded. The actinometer to use in this work is one of the Watkins or Wynne type, which measures the actinic (photographic) power of the light by means of a strip of sensitive paper which darkens to match a standard tint on exposure to light. As this sort of actinometer gives the exposures required, as well as the light values, at any given location and time of day, it is obvious that its use, as here suggested, will prove immensely useful to the reader, and save him from many expensive failures in actual practice.

**Studying
Light Effects** For the experimental study of lighting effects available in different parts of the home, to be followed at one's leisure without the use of plates or films, as suggested in the preceding paragraph, the use of a plaster bust is far preferable to the use of a living model. The bust should be as near life size as may be, and colored with buff or pale terra cotta distemper to approximate the flesh tones of the living subject. Provided with such a bust on a table or other easily movable support, at a height approximating that of the head of a sitting figure, the reader, with or without a camera, may study all manner of lighting effects by placing the bust at different distances and angles in relation to any available light source. In the same way he may observe the changes in lighting and expression which result from the use of the camera at different heights, or by the use of reflectors or diffusing screens, and so obtain much information which will help him when he comes to actual portraiture. Of course, if a living model is available, he or she may be usefully employed for all the purposes suggested. An occasional exposure may be made with profit, as a means of testing one's ability in gauging exposures, or to get any particular effect observed.

In this sort of study the reader should learn to estimate the different quality of the lighting obtained by

direct light falling on the subject from an unscreened window, and that obtained by covering the window with thin tissue paper, or interposing between window and subject a thin muslin or cheese-cloth screen held in the hand to soften and diffuse the light. Observe also the different character and effect of the lightings obtained when the light comes from the direction of the camera, or from a point directly opposite, or slightly behind the subject. In the same way the use of reflectors, or screens of white, light blue or light gray fabric, placed at different angles or positions in relation to the light source, in order to balance the light and shade effects in the portrait, or to give illumination to the darker shadow masses, should be studied with care.

**A Sure
Basis**

In this preliminary and experimental study of light values and lighting effects, the reader will find a simpler and far surer way to success in indoor portraiture than by any following of diagrams and specific instructions for this or that sort of portrait. Every portrait made indoors offers a separate problem, to be handled on its merits and apart. The basic problem in all, however, is that of illumination—light and exposure. By the method suggested you will get at the roots of the whole matter: An understanding of light indoors and how to control it in any given circumstances.

**Finding
New Fields**

Of course, in this odd-moment observation the reader should not confine himself to the rooms of the home, but may profitably extend his experimental study to the portrait possibilities of the halls, stairways and stair landings, doorways or windows opening upon a veranda or into a brilliantly lighted room, and every interior location which seems to offer any opportunity for portrait work. This is one of the special attractions of home portraiture. It offers an infinite variety of lighting effects, far beyond the limited range of the portrait studio, because of the wide variety of light sources available in the home. A test with the actinometer, and perhaps a trial exposure on the plaster bust, will often reveal unexpected possibilities in locations where one might not venture in experimenting with a living model.

**Stair
Landings**

I recall a few delightful portraits of a young girl, made on the top stair landing of a country house, the illumination being provided by a welled skylight in the roof, which gave a lighting similar to that used by the early portrait painters. The exposures, with a lens at $f/6.8$, ranged from two to four seconds.

We have an example of this breaking away from the ordinary room and window in the portrait of "Elsa" among our illustrations. This was made in the dimly lighted hall of a small country home. The light came from an open door, screened by a porch. Note the crispness of the lights on the figure and the charming modulation of tones in the white draperies. This portrait was made on an ordinary, unbacked plate, with an exposure of a full second. The lens was a Cooke anastigmat of 13-inch focus, used at $f/5.6$ —full opening.

**A Fireside
Portrait**

Compare this with the portrait of a girl sitting by the fire in the living-room of a hillside bungalow. Here the obvious difficulty was to avoid harsh contrasts of light and dark. Note how the balancing of light and shade was so managed as to secure vigor in the darks, combined with softness and variety of tones throughout the figure. The shadows everywhere are transparent, and yet we have detail and gradation even in the highest lights. The only illumination available was that given by a door opening upon a screened porch, about 12 feet away from the subject. The screened window behind the figure helped to diffuse and throw the light behind the figure into the shadows. The light was poor, and the success of the portrait depended on the exposure. Eight seconds were given, with the lens already mentioned at full opening, $f/5.6$. Such an exposure, of course, is only possible where the subject rests easily and is well supported. Under very similar conditions, with a lens working at $f/8$, I have given an exposure of fifteen seconds and secured a successful portrait. The lesson is to look carefully to the balance of light and shade in your composition, see that the subject is comfortably placed, and do not be afraid to give sufficient exposure to secure tone and detail. With such an exposure you

can get softness and pleasing tone values by reducing the amount of alkali in the developer, and taking care not to overdevelop.

**In a City
Apartment**

In the portrait of a young boy with biscuit, we have an example of the sort of portrait most frequently attempted by amateurs. Unfortunately, our reproduction is not a fair translation of the original print in that the background is too heavy in tone, and the definition too woolly. From this viewpoint it might well serve as an example of soft-focus work; whereas it was in reality made with an anastigmat working at $f/4.5$. The portrait was made by the light of one window in a city apartment; the window screened with tissue paper and the subject seated about 8 feet from the window. The exposure was one-third second, a small reflector being used to help the shadow side of the figure. The original print, $6\frac{1}{2} \times 9\frac{1}{2}$ inches, exhibits a greater variety of tones in the two sides of the figure than is seen in the reproduction, with a suggestion of color obtained by toning (redevelopment), wholly lost in our black and white illustration.

**Fallacies
about Windows**

There is a general tendency among beginners in home portraiture to work too persistently about the windows of the home. In keeping with this, nine-tenths of the articles on the subject, contributed by amateurs to the photographic press, are chiefly concerned with devices and contraptions for manipulating or controlling windows, as the all-important factor in this class of work. Perhaps this tendency arises in the belief that indoor light conditions necessitate working close to the light-source. If the reader will follow the actinometer observation course outlined in preceding pages, he will speedily divest himself of this fallacy. Or it may be that the tendency springs from a desire to produce the head and bust portrait of the familiar professional type. I hope not. An occasional head or bust portrait may be desirable, but such portraits are at best incomplete and fragmentary in characterization, and lack the suggestion of the home or natural environment of the subject which is the chief interest and charm of home portrait work.

**The Use of
the Figure**

In any event, let me urge the reader to use the entire figure or three-quarter figure as frequently as possible in his home portraiture. In doing this he will not only avoid many difficulties which arise directly from working close to the light source, but he will simplify his work and invest it with an interest and significance not to be found in head and bust portraits. This inclusion of the figure means working at some little distance from the window; the light falls more softly and requires less screening; there is a better envelopment of the figure, with a wider range of tones and more atmosphere, all of which are desirable qualities in a portrait. Apart from this, the natural setting furnished by the room and its furnishings suggests the normal environment of the subject, and adds interest to the composition. There is, too, a wider variety of effect. In working close to the window or light source we encounter serious difficulties: harsh contrasts of light and shade, abrupt shadows unrelieved by detail, and an exaggerated projection of the features—which militate against a pleasing likeness. In the endeavor to overcome these difficulties there is danger of false or crosslighting, due to the abuse of the reflector used to throw light into the heavy shadows resulting from the concentrated, direct lighting. For this reason, working close to the light is perhaps the most difficult way in portraiture, and should not be adopted save in special cases, or for the production of special effects.

It is a mistake to worry unduly about windows in home portraiture. The more skilful we become in working well away

The Window from them, the less they need trouble us. If we have to work with only one window in the room, it will rarely be necessary to do more than stretch the thinnest and cheapest cheese-cloth over it, using a newspaper or two to further reduce the force of the light entering through the lower portion if the window comes down to the floor. Where the window has a southern exposure or the sun shines into the room, then it may be well to use white tissue paper to diffuse the strong direct light, in place of the loosely woven cheese-cloth. In many

cases, however, the window may be left unscreened, a hand screen covered with tissue paper or cheese-cloth, or a clothes-horse covered with either material, being interposed between the window and the subject to diffuse and soften the light. Where much work is in prospect it will be profitable to provide a wooden screen, about 4 by 6 feet, covered with tissue paper. By moving this screen back and forth, up and down, away from and toward the subject, always keeping it between the subject and the light source, the illumination falling on the figure may be varied and softened to any degree desired.

When the room in which we are working has two or three windows, these **Two and Three Windows** should be wholly or almost wholly obscured if they are sufficiently near the subject to produce cross-lighting effects. But observe this closely. If they merely supplement the general illumination of the room without interfering with the principal lighting of the subject, they may usefully serve to throw light into the heavier shadows of the subject, and so should be left untouched, or very simply screened to reduce the light admitted. Oftentimes it will suffice to draw the white shades with which they are provided, or to cover the lower part of each window with newspapers.

Almost always a reflector of some sort **Reflectors** will be needed indoors. Sometimes a newspaper pinned to the back of a chair, or laid on the floor, or a sheet thrown over a screen or held by an assistant will do all that is required. Care should be taken not to place the reflector too near the subject or this will produce all sorts of false tones in the shadows and crosslights in the eyes of the subject. The golden rule is to use a reflector just large enough, and placed in such a relation to the figure, that it will lighten the shadows sufficiently to give them transparency even in the darkest tones, and give balance to the general scheme of light and shade in the portrait. Used with caution a mirror will serve as a reflector in an extreme case. I have sometimes found it extremely helpful in throwing light into the shadows when working in dark rooms. But do not abuse its power.

**A Good
Example**

The group composition included among the illustrations of this issue will repay the reader's study as a good example of the commonsense handling of the window problem. This picture was made in a corner of a large room, with many windows and dark-toned walls and draperies. A window behind the two figures was fully closed and curtained. All the other windows were left in their normal condition. The general illumination was furnished by two windows behind the camera and the window seen in the print. This last window was not tissueed or manipulated in any way, but the light was softened by the thin drapery with which it is seen to be curtained. A sheet, suspended from a cord, and hung parallel with the back of the standing figure, served as a reflector and was used to balance the brilliant, direct lighting of the figures from the window in the view. The lens was a Cooke anastigmat at $f/5.6$, the plate a Stanley ordinary, unbacked, and the exposure was two seconds. Theoretically, this combination should have ruined the photographer's prospects for a successful picture. But note the beautiful modulation of light and range of tones running through the draperies of the figures, the roundness and plasticity of the modeling in both features and figures despite their nearness to the light source, and the subordination of detail in the shadows. Clever as it is, this home portrait group offers no problem beyond the capacity of the intelligent amateur who will follow the broad principles set forth for his guidance in these pages.

**Backgrounds:
Accessories**

The treatment of the background and accessories in this picture invites a word or two about these details, in the management of which many find much difficulty. First, let it be said that the exclusion of the familiar objects found in the rooms of the home, and the use of felt or black cloth grounds permitting the introduction of artificial backgrounds in the negative, is wholly to be condemned, as robbing the home portrait of its intimate interest and charm. Second, that the office of background and accessories may be likened to that of a silent partner. They should support and enrich the presentation of the

principal interest in the portrait (the subject), without being too much in evidence, or in any sense competing for attention. Properly, they supplement the figure and their relation to it is always a relation of subordination. This gives the golden rule: subordinate the backgrounds and accessories in your home portraits by keeping them well behind the figure and lower in tone. But do not attempt to exclude them.

**Special
Effects and
Variations**

When the reader has become fairly expert in his mastery of indoor illumination, the making of portraits embodying novel effects and variations upon the everyday portrait styles with which we are familiar offers an interesting field for experiment. Among these variations may be mentioned high-key or light-tone portraiture, mirror portraits, window and doorway pictures, and against-the-light effects generally, an intensive cultivation of flat lightings with the use of a small, concentrated light source behind the face or figure, the silhouette and so on. In all these variations, involving definite departure from the normal styles, the reader will need considerable patience and skill; but the work is absorbingly interesting and the results will well repay the labor and care required.

**Light-Tone
Portraits**

A high-key or light-tone portrait is one in which the subject is presented by means of a narrow range of the highest three or four tones in the scale of light and shade. For example: Considering this scale as ranging from white to black in ten graded tones, the portrait is rendered in the three or four tones extending from white to medium gray. Mr. and Mrs. Cadby have largely identified themselves with this specialty, and their delightful portraits of children, executed in light tones against a light ground, have evoked world-wide curiosity and admiration. Weston, Hutchinson, Minns, the Parrish Sisters, and others have produced beautiful examples of this method on this side of the Atlantic. It is decidedly novel in effect and, when carefully carried through, gives an indescribable charm and daintiness to the portrait. It can only be applied successfully in a few cases and should be used with great discrimination.

Choice of Subject

In practice the method is not altogether simple. Success depends largely upon the care and thought given to the problem in hand before the camera comes into use. It is peculiarly suited to children and young women of the fair or blond type, and rarely applicable to men or subjects with a profusion of dark hair and ruddy or olive complexions of the Italian or Spanish types. In other words, there should be no startling contrasts of tone or color in the subject.

The Key to Success

The keynote is delicacy in detail and tone values, with an absolute avoidance of heavy shadows or muddy patches of tone. The introduction of elements of dark tone, such as red sashes, prominent design in the costume, or black shoes will, of course, completely upset the narrow range of tones in which the subject is to be presented.

Working Methods

In making such a portrait the subject, attired in white or light-tone clothing, is first enveloped in a superabundance of soft, diffused light. The background, foreground, and any accessories employed are white or very light in tone. Such an arrangement may be secured by constructing a small studio about any convenient window by means of screens or clothes-horses and sheets. Usually a flat lighting is employed, the Cadbys apparently placing their subjects directly across the source of light, Weston using a cross lighting with one source much stronger than the other. Weston's method is undoubtedly the more difficult to handle, but produces a richer variety of light effects and greater luminosity in the modeling of the features. In both methods the breaking up of the planes and spottiness of effect due to cross illumination and re-reflection are evils to be avoided. I quote Mr. Weston:

"The two sources of light should be nearly at right angles to each other and the subject should be placed considerably closer to the smaller one, which is to be of clear glass or an open door; the other source is several times as large but either of ground glass or diffused with cheese-cloth. If the shadow side, so-called—that nearest the larger source of light—is too heavy, move the sub-

ject toward this. If rightly placed, one now has a beautiful soft lighting with here and there brilliant but very delicate highlights on hair or cheeks or nose, depending on which way the head is turned. With different subjects the direction of the light may be varied, even to come from behind, but the suggestions given will be a foundation to build on.

"We have now reached the question of exposure. Despite the fact that apparently very quick exposures can be made, one must avoid underexposure or court failure. Enough time must be given to secure a dense, now mind, dense *not contrasty*, negative. In fact it might be called an overexposure, for one must expose long enough to develop a dense negative and still have it flat. A dense negative holds up better in the printing, retaining the delicate gradations which would probably be muddy if printed from a thin negative. At all events the average exposure will be quick enough to catch little folks. In my own case the time is about one-half second with lens at $f/5.6$ on Hammer Red Label plates. Pyrometol developer, with less carbonate than is called for, and without bromide is my favorite developer.

"For a background unbleached cheese-cloth or canvas may be used. A sheet is liable to be too glaringly white.

"My plates are invariably tanked—a long, slow development being essential to the best results in the delicate pictures desired. And then, I believe development should be automatic, to a great extent. One should make the original lighting with the finished picture in mind and then forget juggling to get effects. Some attempt to obtain gray pictures by using an ordinary lighted and exposed negative and then doctoring their developer in the final printing, using a weak solution or printing lightly. These methods usually result in false values and cannot be recommended. Get your lighting and exposure correct at the start and both developing and printing can be practically automatic."

A most acceptable variation from everyday portraiture is found in the mirror portrait, a clever example of which may be seen in the frontispiece of this issue. I

Mirror
Portraits

wonder that more of this sort of work is not done. It affords a portrait which gives us two views of the subject with distinct differences and an altogether different composition. Many charming effects are thus obtainable. Thus a profile and full-face portrait is one of the simplest combinations. Two profiles are also very attractive and easily managed. In figure portraits, where the lines of the figure and hands are carefully composed, the repetition of pleasing lines, with the variety resulting from reflection, may be made to give added pictorial beauty or effect to the picture.

**An Expert's
Notes**

Mr. Charles H. Davis, who generously supplies all the illustrations for this little book, is an adept in this particular style of portraiture. As his work is done wholly in and about his own home or those of his patrons, I am glad to publish the following notes on mirror portraiture from his experience.

The only difficulties in making mirror portraits concern the lighting of the subject and the placing of the mirror so as to get a pleasing reflection with attractive lines, free from distortion and disturbing reflections. A few experiments with a patient model will enable the reader quickly to overcome these difficulties and give him a grasp of successful procedure.

Mirrors

The most suitable kind of mirror for this work is an oval mirror about 18 x 24 inches in size. With such a mirror the changes of form and shape due to perspective are not apparent. A pier mirror is easily managed if not too heavy and readily movable to any desired position. Small rectangular mirrors bring up many difficulties of perspective. If, however, a large rectangular mirror is the only one available, it should be so placed that only one side will appear in the picture, in which case the camera can be adjusted to give a straight line on the side shown in the portrait.

**Equal
Sharpness**

To secure the same degree of definition in the real and reflected images, the mirror should be placed at an angle of about 45 degrees to the camera, and the subject so placed that the reflected image in the glass is at an equal dis-

tance from the lens, as is the subject. If this is carefully done, the sitter and the reflection will be nearly in the same plane, which will give the agreeable definition or sharpness desired in both images.

Distracting Lights It is obvious that if the source of light utilized in making the portrait is opposite the mirror, a brilliant spot of light will appear in the mirror, and this will prove very troublesome in the camera. To remedy this, place the mirror first and obscure the reflections from the point where the camera will be placed. The mirror, however, must be so placed that a satisfactory light falls on the subject without a violently contrastive lighting, otherwise the reflection, which generally gives the shadow side of the face, will be poorly illuminated. Often it will be found necessary to tilt or slightly turn the mirror to get the desired effect of pose or lighting in the reflected image. This is done by using a wad of newspaper at the proper point behind the mirror.

Cutting Out Reflections Undesirable reflections of surrounding objects may be cut out by using a screen or light-tone fabric ground thrown over a clothes-horse to exclude the disturbing objects. Experiment and observation will soon give facility in these points, according to the position of the mirror.

The Frontispiece In making the portrait which serves as the frontispiece herein, the room had windows facing south and west, with a wide doorway on the east side opening into a well-lighted adjoining room. The light used was that given by the window facing south, wholly covered with white tissue paper. The mirror hung at a convenient height on the south wall, about eighteen inches to the right of the window. The subject was placed close to the mirror and the latter adjusted by tilting slightly so as to give an attractive reflection. A large light-tone background, placed at an angle of 45 degrees to the window, helped to illuminate the shadows in the subject, and this was further helped by the light (subdued) coming from two windows in the west wall of the room at the left of the subject. The camera was placed well into the room, about six or eight feet away from the right

side of the window, and at an angle of about 45 degrees from the mirror, thus forming the apex of a triangle covering window, mirror, reflector, and subject.

Windows and Doorways Handled with restraint and discrimination, the windows and doorways of the home offer many opportunities for obtaining interesting portraits, with unusual lighting effects. Almost invariably, such portraits include the full figure, sitting or standing, so that their making calls for some knowledge of composition and a sense of design, in order to secure good lines and a pleasing arrangement of light and shade. The long, low window seat is especially adapted for groups of two or even three figures, and I have seen it effectively used for a full-length, horizontal figure portrait of a young boy of the "Little Lord Fauntleroy" type, engrossed in a book. Sometimes, but rarely, a doorway lends itself to a portrait group of two figures, such as a wife's or mother's greeting of the soldier returning after the war, or the greeting of a visitor by her hostess on entering the house. In single figure doorway pictures we have the familiar example of the young wife or girl, standing in the doorway, shielding her eyes with one hand as she watches for the coming of husband or lover.

The Window Portrait Generally speaking, there are three ways of treating the window portrait. In the first, the figure is shown in semi-silhouette, a soft, flat lighting illuminating the face, with a few brilliant accents of light upon the figure. In the second method, the subject is brilliantly illuminated by the light entering at the window, as in the portrait group among the illustrations of this issue. In the third method, the figure is situated at some little distance away from the window, and more of the interior of the room is included, the whole composition being softly illuminated, with plenty of detail in the shadows of the subject. Examples of this last method may be seen in the clever home pictures of children by Sidney V. Webb in *THE PHOTO-MINIATURE* No. 130. These, of course, are simply suggestive, and there are innumerable variations, examples of which may be referred to in *THE PHOTO-MINIATURE* Nos. 141 and 142.

**Its First
Introduction**

The window portrait, as a professional specialty, was originally introduced by Charles H. Davis, of New York. His work included some delightful portraits of women, skilfully posed before a curtained window. Since that time the window portrait has become popular among professional photographers of the better sort here and in Europe, but I cannot recall anyone whose work has surpassed that of Mr. Davis. As a distinctive style in portraiture, however, it is peculiarly suited to the amateur working in the home.

**Initial
Difficulties**

Because in window and doorway portraiture we are dealing with strong contrasts of light and shade, often photographing directly against the light, so that the exposure required for the shadow portions of the subject will be many times that needed for the window or light source included in the composition, it is obvious that we must provide beforehand for certain difficulties likely to be encountered in working under such conditions.

Flare

Thus, in photographing directly against the light, which may be a sunlit window or brilliantly lighted out-of-doors beyond an open doorway, the use of a modern compound lens of the anastigmatic type or a portrait lens is apt to result in flare. Hence the use of a single achromatic lens, or the rear element of a rectilinear, with fewer elements and less reflecting surfaces than the compound lens, is advised for this work. Of course, where the subject is so placed that the strong light entering the window does not directly strike the lens, or the window is well curtained, then the modern anastigmat offers the advantage of speed without much fear of flare. The use of a lens shade in this sort of work will always result in more brilliant negatives.

Halation

The second difficulty is halation—the spreading of the light in the form of halo beyond the lines of the image. This can largely be avoided by the use of films instead of plates, either roll films or the new Eastman Portrait or Commercial Ortho Films. If plates are used, these should be of the double-coated, non-halation sort, or ordinary

plates backed with a non-halation mixture. Some workers advise a color-sensitive non-halation plate and adjusted three-times color filter; but this means exposures of ten to fifteen seconds or more. For development two methods are advised: In the first, a soft-working developer such as metol, without bromide, or Azol (1 to 30). The plate is withdrawn from the developer at the first signs of fog after the details of the subject have appeared and, if necessary, intensified after drying. According to the second method the three-solution pyro developer, very weak in sodium carbonate, is advised, the plate being soaked for a few minutes, before development, in a 10 per cent solution of potassium bromide. Over-development is to be avoided. The sort of negative needed is one thin in the highlights, full of detail in the shadows, and with clear glass only in the lowest tones of the subject.

Despite the seeming reasonableness of these precautions, many skilled workers of my acquaintance use a modern anastigmat, ordinary unbacked plates or Portrait Film, do not vary their usual method of development except to minimize the proportion of alkali, and yet turn out very acceptable home portraits. How do they do it? Their success, or freedom from the troubles mentioned in the preceding paragraphs, is explained, as I think, by their handling of the illumination and lighting of the subject. By this I mean that they insist upon a soft, diffused illumination, which gives detail in the shadows and softer accents in the lights without excessive contrasts or lengthy exposures. In other words, they so control the light conditions as to express the subject within a narrow range of tones.

This problem of illumination is the crux of window and doorway portraiture, and so is worth our consideration. The beginning amateur is apt to go at it unthinkingly. The professional, enslaved by his habit of gauging the subject by its appearance on the ground glass of his camera, sees the desperate necessity of diffusion, modification, supplementary lighting, and so on, as means of equalizing or balancing the excessive contrasts of light

and shade inherent in indoor illumination. To this end he chiefly favors artificial lighting.

To this end it is well to avoid direct sunlight or the middle hours of the day for home portraiture. A day when the sun is obscured by light clouds, or the diffusion secured when a bright sky is slightly overcast, offer more favorable opportunities. Similarly, the hours before eleven and after one are more favorable than high noon. The use of reflectors and screens will also be found helpful to throw light into the darker portions of the subject, or to soften an intense light falling directly on the subject. The supplementary lighting of the shadow portions of the subject by means of other windows or doors in the room where we are working, or by means of a small charge of flashlight at the close of the daylight exposure, are other means of balancing the illumination. Of course, in the use of any supplementary lighting, care must be exercised to avoid cross or double lighting in the subject. This is easily done by subordinating the intensity of the supplementary to the principal source of illumination. A typical exposure under such conditions, with a lens working at $f/11$ or $f/16$, would be one second, a charge of three-fourths of an ounce of flashlight (compound powder) being ignited during the exposure, with the lamp slightly at the left and above the camera.

During the past few years some of the more prominent society publications, such as *Vogue* and *Vanity Fair*, have published many attractive portraits by Baron De Meyer. These are characterized by unusual light effects, worthy of the study of home portrait workers seeking to do something out of the ordinary. In these portraits the subject, generally seen against an interior scene or background of light tone—such as a screened or curtained window at eight or ten feet behind the figure—is enveloped in the soft, flat lighting which results from placing the subject directly across the light, with a generally diffused illumination. There is abundant detail everywhere, with soft definition, and veilings or diaphanous fabrics are beautifully rendered in delicate

Novel Effects
by De Meyer

tone values without heavy shadows. But the outstanding feature of the lighting is the marked luminosity of the outlines or contours of the subject. The face and head or the upper portions of the figure are, so to speak, fringed with light. This is apparently secured by the use of a small, concentrated light, placed behind the head or figure at such a height as to give the effect desired in any particular case.

I am unable to give any details as to
How Baron De Meyer's methods; but it would
Produced seem that such a lamp as Gray's Parallax Reflector Lamp (as made for enlarging), with a 250-watt electric lamp, upon a long, flexible cord, would give the volume of light and ray-like spread necessary to secure the effect. Even an ordinary 60-watt lamp, placed near and behind the head of the subject, produces a pleasing lighting of the sort described. It is possible that a series of lights erected on a vertical standard behind the figure, with suitable reflectors, is employed to get the lighting seen in some of the portraits published. Of course, the light and reflector system used is so small as to be completely hidden by the head or figure of the subject as viewed from the camera. Here, as in window portraiture, the exposure must be full, so that development with a diluted, soft-working developer will give a thin, detailful negative. Probably portrait-film and pyro-metol is the combination best adapted for this class of work. Softness, both in definition and illumination, is the keynote, and anything approaching hardness in the negative should be avoided. In De Meyer's portraits after this manner there is a pleasing softness and diffusion throughout, which lends emphasis to the light accents produced by the concentrated supplementary lighting behind the subject.

It is obvious that this method of lighting offers much scope for the play of individuality in the production of a variety of effects—according to the placing of the subject and the distance of the light away from the figure. That its use should be accompanied with considerable experiment and discrimination in the choice and treatment of subjects goes without saying. Its abuse naturally results in bizarre and theatrical effects,

often as ludicrous as they are unnatural. But in capable hands it has produced extremely interesting results.

Halls and Doorways

Often a place may be found in a hall, or a fairly wide doorway opening into a hall, offering a pleasing illumination and setting for the home portrait. Here the background details and accessories will naturally retire and be subordinated in tone, and the obtaining of atmospheric effect will present no difficulty. A favorable location of this sort may sometimes be provided by placing the subject just within the doorway entering the hall with the camera on the porch, so that the figure is seen against the interior of the hall as a background. Similar effects may be had, where we have windows opening to the floor, by arranging the subject close to the open window opening and photographing from the porch or lawn. Many very desirable poses of the standing figure are available in this last arrangement. Choosing the time of day carefully, so that the light is well diffused, giving desirable detail in the heavier shadows of the figure, and using a fairly rapid plate or film and a lens at $f/6.8$, the exposures will vary from one-half second to three seconds, according to the quality of the light and its volume in a particular instance.

Porch or Veranda

This brings us to a brief consideration of the porch or veranda as offering many favorable opportunities for portrait work, not yet sufficiently appreciated by amateurs. Here, as a rule, the light is softer, because more diffused and quicker, because more abundant, than indoors, making good portraits easily available. The light in such a location and its photographic quality will, of course, vary with the construction and aspect of the porch. Some porches are restricted in size, heavily overhung as to roof, and darkened by nearby foliage; others are bathed in sunlight most of the day and the light changes with every passing cloud. First, familiarize yourself with the porch by actinometer observation and a few experimental exposures with plaster bust or living model. Your after-success will depend chiefly on your familiarity with the general conditions of illumination peculiar to the porch on which you work. During

your observation with actinometer and bust, you will find at least two or three positions giving, with the possible aid of cheese-cloth or tissue screens, a soft and mellow light altogether favorable to the making of portraits. These should be noted for use when needed.

**Controlling
the Light**

As a rule, the wall of the house abutting on the porch will furnish all the reflected light needed to illuminate the shadows of the porch portrait, whether head or figure, but sometimes a sheet tacked along one edge only to the wall, and held at such an angle to the figure as will best help the modeling, will be found helpful. If the porch is shallow as to depth, so that the lighting on the subject is inclined to be too direct for softness, the use of a handscreen covered with tissue or cheese-cloth is indicated. Generally, the fine-mesh wire screens used to screen the average country house porch give sufficient diffusion for the purpose. If the porch is screened with foliage, care must be exercised to see that this does not appear too prominently in the composition of the portrait, so as to distract the attention from the figure. A good example of this is seen in the portrait of Miss Ethel Newcomb, among our illustrations. Here the camera was placed in the main doorway of the home, looking almost directly across the porch on to a lawn shaded with trees whose foliage closely approached the porch itself. Note how skilfully the photographer here utilized the pillar and nearby foliage to form an effective background for the portrait. We have in this portrait a very simple and natural lighting of the subject, the spacing is admirable and the richness and variety of tone values gives interest to every part of the composition. The portrait was made with a Cooke lens at $f/5.6$, Stanley, unbacked, plate of normal rapidity, and an exposure of one-third second. It is interesting to note here, as to exposures on porches, that if the figure had been moved say 12 or 15 inches nearer the door and so away from the sky light at the edge of the porch, the exposure would have had to be increased at least four times to secure the same effects. The use of the actinometer exposure meter will be of material service in such a difficulty.

**Outdoor
Work**

In outdoor portraiture about the home, as in gardens or nearby grounds, the difficulties and problems peculiar to indoor work give way to questions of quite another sort. Here we have to deal with diffused instead of concentrated, direct light—a superabundance of illumination, which seems to flatten the natural roundness of the face and figure to an alarming degree. The outdoor background, formed by natural objects, seems to be altogether too much in evidence wherever we turn, and we quickly perceive that our chief difficulty is that of controlling the light and the surroundings of the figure.

Exposures

Exposure, as a rule, presents no difficulties out-of-doors; even with a lens as slow as $f/16$, one may make successful portraits with exposures of from one-twenty-fifth to one-fourth of a second, and only rarely, in a very dull light or in the shadow of the home or trees, will the exposure have to be prolonged to one-half second or more. Thus the portrait of mother and baby at the sun-dial, to be seen among our illustrations, represents a garden exposure under the open sky late in the afternoon, viz., one-twenty-fifth of a second with a lens at $f/5.6$. In making this portrait the arrangement of the subject was rehearsed before the actual photographing. When ready, the mother walked up to the sun-dial (the point of focus), stopped quietly, and the photographer made the exposure. The portrait group of a mother with her sons, made in the shade of a large tree on a sunny September day, required a full half-second exposure. It is an example of the photographer's ability to see the desired effect before making the picture, and so deliberately choosing a location for the photographing where the direction of the light and its quality by reason of the location will give him what he desires in his work. Note the absence of harsh contrasts, and how softly the light falls upon all the figures despite their separation.

**The Figure and
Background**

Except when working in sunlight or on brilliantly lighted days, with a Graflex or hand camera and direct vision finder and fast lens, a tripod is just as necessary out-of-doors as in indoor portraiture. This not merely because of

the length of exposures, but chiefly because the composition of the figure and its surroundings is of vital importance in the outdoor portrait. Especially one needs to prevent the figure from sinking into or forming disagreeable or incongruous combinations of line and form with its surroundings. The obtaining of relief for the figure, the subordination of the background objects, the separation of the planes, and the avoidance of displeasing or incongruous combinations is best secured by observing the portrait on the ground glass screen—as the lens sees the subject. By this means one can control the definition to give an agreeable separation of figure and background, and change the position of camera or subject so that disagreeable or disturbing lines are eliminated or rendered less noticeable in the composition of the portrait.

**Height of
the Camera**

The height of the camera has much to do with the relative height of the subject in relation to its nearby surroundings.

As an example: photograph a young girl standing against a bush or shrub of approximately the same height, with the camera at 8 feet away and at the normal height for a standing figure. Now move the subject to a position where the ground falls away, so that the figure stands out against the sky, and make a second photograph from the same distance away, but with the camera about 3 feet from the ground. Note the difference in the apparent height of the two figures within the same picture space. By this variation of the height of the camera it is often possible to avoid the appearance of a figure being enveloped or merged with a nearby bush or group of shrubbery. In the same way, note on the ground glass how the relative positions and heights of objects surrounding or behind the subject will give rise to incongruities in the portrait: a tree in reality some distance behind the figure will in the picture appear as if growing out of the head of the subject, the long hard lines of the back of a garden seat will seem to cut the figure into two halves or sever the head, or the sharply defined trellis of a fence or garden screen close to the figure will apparently imprison the subject as in a vise.

**Various
Lightings**

The most favorable light for outdoor portraiture is that of a summer morning or afternoon, when the sun is barely hidden by light clouds. This gives a well-diffused illumination with just sufficient sparkle to brighten the high lights in the figure. The advice commonly given to avoid sunlight, and to photograph with the sun or predominant light coming from behind the camera, may be disregarded with advantage in many cases. So long as the sunlight or strong, direct light does not fall directly on the face of the subject and the eyes are well protected from the glare of the light, one may secure many delightful effects. Similarly, by placing the subject directly against the light and carefully shielding the lens from the sun by means of a lens shade or other similar expedient, a variety of desirable effects may be obtained. For the normal portrait, especially of those who are past their youth or whose faces betray the ravages of time, the soft, quiet light secured under the shade of a tree or around the walls of the home, will give the most pleasing lightings. In this lighting the strongest illumination should come from one side of the subject, and the head may be turned so as to secure a desirable roundness and modeling. Sometimes a nearby bush, or projection of a window, may be utilized to secure the depth of tone desired in the shadow side of the face. Very often a doorway in a garden wall, opening out upon a shady avenue or mass of foliage in shadow will offer an advantageous location for this sort of lighting. In many gardens, too, we will find a summer-house or shaded seat with rich possibilities for effective arrangements for single figures or small groups. The important thing is to familiarize yourself with your location and its possibilities with a model, if this be possible, before the actual portrait-making. The aim in this experimental observation should be to learn to see the scheme of lighting available in any given spot and study its appearance on the ground glass of the camera. With this familiarity as to local conditions, then, the golden rule for successful outdoor portraiture is to give a full exposure and develop with a diluted developer weak in alkali. This will give a soft, detailful negative.

Books and Prints

THE BRITISH JOURNAL OF PHOTOGRAPHY ALMANAC, 1920. Edited by George E. Brown, F.I.C. 642 pages, with a Vandyck Photogravure frontispiece. Paper covers, 75 cents; cloth edition, \$1.50. Postage extra. London: Henry Greenwood & Co. New York: George Murphy, Inc. Obtainable from all dealers.

Filled with good things, as usual, only more so, the familiar "B. J. Almanac" comes again for the helping and inspiration of the world's photographers. I sometimes wonder whether Editor George E. Brown fully realizes how much his patient, painstaking work in the "Almanac" is appreciated by those who buy it year after year, and find it a never-failing help in their work. The principal feature of the new volume is a capital digest of "Photographic Definitions," in which the Editor explains with clearness and brevity the thousand and one photographic terms and problems which are forever coming up in daily practice. Following this we have sections summarizing the new information of the year concerning Apparatus; Equipment and Materials; Photographing Various Subjects; Negative Processes; Printing Processes; Color Photography; and Formulæ for the Principal Photographic Processes, with Standard Tables.

I spent a long enjoyable evening with my copy of the "Almanac" as soon as it reached me, and I can assure the reader of an equally happy experience if he will get a copy from his dealer and sit down with it in a comfortable chair and a long night in front of him.

THE AMERICAN ANNUAL OF PHOTOGRAPHY, 1919. Edited by Percy Y. Howe. 296 pages; 24 plates; 140 illustrations; index. Paper covers, \$1.25; cloth bound, \$1.75. Postage extra. Sole sales agents: George Murphy, Inc., New York. Obtainable from dealers generally.

The troubles and difficulties which beset the makers of books in war time do not seem to have interfered with the publication of this well-known annual, which comes to my table on time, and as replete as ever in information and pictures. The text papers, by American and English writers, cover the usual wide variety of subjects of interest to the amateur, beginning with the "Conservation of Material" by C. H. Claudy, and ending with a fully illustrated article on "Bird Photography" by A. H. Cordier. A noteworthy paper is that in which A. Lockett discusses "View Finders—Good and Bad," in which this interesting detail of hand-camera work is explained with a fulness not to be found elsewhere. The "Formulary" at the end of the volume needs revision and bringing up to date.

X-RAYS. A handbook of practical information for the Roentgenologist. 48 pages. 15 cents. Published by the Eastman Kodak Company, Rochester.

Roentgenographic technique and interpretation are assumed to be part of the professional training of the modern Roentgenologist. This pamphlet has for its purpose to present to the Roentgenologist those essential laws and practices which, if followed, will help him to produce negatives that are photographically correct. The book has the twin merits of brevity and clearness and should be seen by all the workers in this specialty.

THE WORKROOM. A Manual of Useful Information for the Photographic Worker. Compiled by Thomas Coke Watkins. 168 pages. Paper covers, \$1; cloth bound, \$2. Edward L. Wilson Co., New York.

The title-page and index of this volume fail to give any adequate idea of the wealth of information to be found between its covers. It consists of a carefully made compilation of hundreds of formulas, methods, notes and processes, covering the wide range of everyday photography, apparatus, equipment and practice. These are taken from the literature of the last ten years, and answer almost every question and need of the

photographic worker. For example if you want to know about "Mirror Portraiture," see page 110; or if you seek formulas for flash powders, see page 115; or "Simple Background Paintings," see page 92; or "The Use of Chiffon in Enlarging," see page 29; and so on *ad infinitum*, as the learned pundits say. It is one of those rare books which are so full of information that "no photographer's bookshelf is complete without it" and the wise man will see that he has it at hand for reference when needed. Mr. Watkins deserves the gratitude of the world for his labors in its making.

KODAK AFTER THE WAR is a beautifully illustrated broadside of 11 x 14 inches, reproducing thirteen advertisements intended to illustrate after-the-war uses of the Kodak, to be inserted in various periodicals during the year and so reach about 65,000,000 possible users of Kodaks. Eastman Kodak Co., Rochester, N. Y.

HOW MOTION PICTURES ARE MADE. By Homer Croy. 366 pages; 100 illustrations. Cloth, \$4. New York: Harper & Brothers.

This is a popular account, brightly written and attractively illustrated, of the evolution of the motion picture and of the methods employed in the production of the "films" which have delighted the "movie fans" of the past twenty-five years. From this viewpoint it is the most satisfactory, as it is the most complete, work on its subject. In the first hundred pages the author tells of the historical development of the motion picture, beginning with the Wheel of Life (1833?) and ending with the Cinematographe of Lumiere Brothers (1896). This part of the work, although incomplete, is especially interesting as giving many details of the work of American inventors, from the re-invention of Desvignes' Zoetrope by William F. Lincoln, of Providence, R. I. (1867) and the earlier and more remarkable Kinematoscope of Dr. Coleman Sellers, of Philadelphia, (1861), to the later work of Eduard Muybridge (1872-1882), Edison (1893), and C. Francis Jenkins, who, on

June 6, 1894, at Richmond, Ind., gave the first public exhibition of motion pictures as we know them today. The fifteen chapters following offer interesting descriptions of the actual production of motion pictures of popular, educational, and scientific subjects, with a discussion of the possibilities of the motion picture in war, advertising, under the sea, in color, and talking-pictures.

Despite the popular and non-technical style in which the book is written, it will be found to offer much useful and suggestive information to the motion picture photographer and exhibitor, and may, perhaps, be summarized as a book which breathes the breath of life into the dry bones of the more critical, and therefore more valuable, work on "Living Pictures" published by Henry V. Hopwood, in 1899, of which a revised edition appeared in 1916.

LANTERN-SLIDES: How to Make and Color Them. 32 pages, with diagrams. Published by the Eastman Kodak Company, Rochester, N. Y., and sent free on request.

In this useful brochure the reader will find a summary of approved methods of making lantern-slides by contact printing, by projection, and by means of the Kodak Enlarging outfit. Part II tells how to color slides with the Velox Water Color outfit; tinting by immersion; toning by direct development; and dye-toning with American-made dyes. This latter is, I believe, the first publication of methods and formulas for the dye-toning process, extensively used by motion picture producers. The brochure, with its handy list of accessories, is a welcome addition to the photographer's bookshelf.

TINTING AND TONING OF EASTMAN POSITIVE MOTION PICTURE FILM. By John I. Crabtree. Second Edition, revised, 1918. 32 pages, with many samples. Cloth, \$2.50. Eastman Kodak Co., Rochester, N. Y.

The uncertainty of result heretofore inherent to the

methods and materials available for the tinting and toning of motion picture film is completely removed by Mr. Crabtree's clear and workmanlike treatment of the subject in this handbook. The formulas and dyes mentioned in the text have been subjected to careful test in the Eastman Research Laboratory, the author's notes cover every step in the manipulations required with commendable detail, and the thirty-three samples of toned and tinted film bound in at the end of the book show exactly what the various methods and formulas will give.

Mention of Mr. Crabtree reminds me that his article on "Chemical Fog" in "The American Annual of Photography, 1919," is the clearest and most comprehensive summary of practical information on that subject published in recent years.

STANDARDIZATION OF THE MOTION PICTURE INDUSTRY, AND THE IDEAL MOTION PICTURE STUDIO. In a readable paper on this subject, read by John W. Allison before the Society of Motion Picture Engineers, New York, last October, an earnest plea is made for the establishment of a research laboratory in connection with every motion picture studio, with the purpose of standardizing the conditions affecting the lighting of subjects, the exposure and development of films, and the testing and checking of film before and after use. There can be no doubt but that Mr. Allison is right in his claim that this would materially improve the quality of the output of any studio following the suggestions given. It is equally indisputable that the following of his very practical suggestions by many photographers would result in a desirable improvement of the work of the professional portrait or commercial studio.

PICTORIAL PHOTOGRAPHY IN AMERICA, 1920. The Pictorial Photographers of America (see page 461 of THE PHOTO-MINIATURE No. 167) propose to publish, in October next, their first volume of reproductions of selected examples of the work of American pictorial

photographers. The volume will, in general makeup, resemble "Photograms of the Year" and will consist of about one hundred pictures, carefully reproduced and printed on art paper, with thirty-two pages of text in which competent writers will review the progress of pictorial photography in America during the year.

The book, attractively printed and bound in boards, will be published at \$2.50. Advance orders should be sent to Tennant and Ward, 103 Park Avenue, New York, selling agents for the work.

MAP PHOTOGRAPHY. A careful digest of three articles on this subject, contributed by H. A. Williamson to the *Coal Age* of June 8, 15, and 22, 1918, may be seen in the Lefax Filing Index (Philadelphia, Pa.). Mr. Williamson has charge of the photographic department of the Consolidated Coal Co., Fairmont, W. Va., and was led to prepare the articles mentioned by the lack of practical information concerning the use of the camera in the drafting-room for the reproduction of maps, documents, plans and line subjects generally. The articles are full of very practical information and should prove invaluable to those engaged in this work.

PHOTOGRAMS OF THE YEAR 1918-19. An Annual Review of the World's Pictorial Photographic Work. Edited by F. J. Mortimer. Paper covers, \$2; cloth bound, \$2.50. New York: Tennant and Ward.

Extremely interesting in text and illustrations, and offering some eighty odd reproductions of the best pictures of the year, this new volume of "Photograms" well sustains its reputation as a treasury of suggestion and inspiration for those who seek to make pictures with the camera. Among the pictures reproduced are examples of American, British, Canadian, Australian, Japanese, Swedish, Dutch, Spanish and Egyptian work, embracing a wide variety of subjects and notable for the general reasonableness of treatment running through them all. The frontispiece is a wonderful bit of cloud photography with, of course, the inevitable aeroplane,

and foretells the new possibilities in this field opened up by the coming of the aeroplane. It is not possible to mention individually the many outstanding pictures which make one linger in looking over the volume, but I cannot help again expressing my admiration of Mortimer's "The Gate of Good-bye," which combines skill and artistry in outdoor grouping and story-telling in a way altogether rare and delightful.

The entire editions of "Photograms of 1918-19" printed for Great Britain and America were completely sold out before publication, so that those who did not order the book in advance will be lucky if they can find an unsold copy in the hands of their local dealer.

MIRRORS, PRISMS AND LENSES. A Textbook of Geometric Optics. By James P. C. Southall. 579 pages. Cloth bound, \$3.25. New York: The Macmillan Co., 1918.

This is a handy volume comprising the substance of a course of lectures delivered by the author at Columbia University, New York, and designed to furnish the student with an introduction to the theory of modern optical instruments. It is also, in a sense, an abridgement of Southall's "Principles and Methods of Geometric Optics," with new and original matter not given in the earlier and more comprehensive treatise. A special feature is the presentation of a number of "Problems" at the end of each chapter, intended to test the reader's grasp of the information given.

Contents: I. Lights and Shadows. II. Reflection of Light; Plane Mirrors. III. Refraction of Light. IV. Refraction at a Plane Surface and also through a Plate with Plane-parallel Faces. V. Refraction through a Prism. VI. Reflection and Refraction of Paraxial Rays at a Spherical Surface. VII. Refraction of Paraxial Rays through an Infinitely Thin Lens. VIII. Change of Curvature of the Wave-front in Reflection and Refraction; Dioptry System. IX. Astigmatic Lenses. X. Geometric Theory of the Symmetrical Optical Instrument. XI. Compound Systems; Thick Lenses and Combinations of Lenses and Mirrors. XII. Aperture and Field

of Optical System. XIII. Optical System of the Eye; Magnifying Power of Optical Instruments. XIV. Dispersion and Achromatism. XV. Rays of Finite Slope; Spherical Aberration; Astigmatism of Oblique Bundles; Index.

THE PITTSBURGH SALON.—The Sixth Annual Pittsburgh Salon, held in the spacious art galleries of the Carnegie Institute of that city, March 3 to 31, is generally pronounced to have been the most successful of the salons thus far held under the auspices of the Photographic Section of the Academy of Science and Art of Pittsburgh. First, therefore, a word of high praise for the officers of the Section: President O. C. Reiter, Vice-President M. C. Rypinski, and Secretary C. K. Archer, and Messrs. Wooldridge, Mellor, and Hartley, to whose painstaking labor and enthusiasm the success of the affair was due.

About nine hundred prints were submitted to the Committee of Selection, Dr. J. D. Ruzicka, of New York, John Paul Edwards, of Sacramento, Calif., and Samuel A. Martin, of Pittsburgh. Some two hundred and eighty-two prints were accepted, including seventy-seven from twenty-five New York exhibitors, seventy-four from twenty-two California workers, thirty-six from fifteen Pennsylvania pictorialists, the remaining ninety-five prints being sent by exhibitors from fifteen states. There were no exhibits from abroad, so that the Salon was all-American in its representation of pictorial photography. The arrangement and hanging of the exhibits were ideal, these details having the supervision of an expert on the staff of the Institute.

Taken as a whole, the Salon seems to have shown a desirable growth in reasonableness and control among our pictorial workers. This was evidenced by a general lack of that vagueness as to form and perspective which has marked the pictorial work of the past few years, obviously due to a better understanding and more discriminating use of the soft-focus lens. There was evident, too, a clearer grasp and more intelligent following of the basic principles in pictorial composition, and of a

steady working away from extremes, which lent an added interest to this year's Salon.

Landscapes naturally predominated among the exhibits, but there were many portraits and figure studies of distinct merit, and a few seascapes, coast-scenes and water-scenes of notable quality. Among the landscapes the critic familiar with American photographic exhibitions of past days could note a marked advance in the treatment of the subject, and especially in the rendering of the subtle effects contributed by snow, clouds and sky, sunlight, haze and unusual atmospheric conditions. In portraiture, too, there was seen a praiseworthy effort to subdue the tendency of the photographic process to super-emphasis of unimportant details, and to express the character of the subject with a proper appreciation of the value of control and illusory effect. Save for a notable exception or two, the militaristic note was almost completely absent, and there were few architectural pictures, although in several of the portraits and figure studies there was an obvious effort to utilize the aid of architectural detail in the treatment of the subject.

For a detailed review of the pictures of the Salon and their makers, the reader is referred to the illustrated papers published in *Photo-Era*, *The Photographic Journal of America*, *Camera Craft* for May, and the *Pittsburgh Index* of Saturday, March 1.

CARBON AND OZOBROME.—As evidence of a revival of interest in these two printing processes—almost forgotten here in America—an exhibition of carbon and ozobrome prints by prominent British pictorialists is being held in the rooms of the London Camera Club. Special mention is made of the examples of portrait work in carbon by Craig Annan and the Earl of Carnarvon, and a collection of landscapes by Thomas Manly, the inventor of Ozotype and Ozobrome.

AN EXHIBITION OF AËRIAL PHOTOGRAPHY.—During April there was held, at the Grafton Galleries, London,

an exhibition of unusual interest, comprising some two hundred photographs, many of them enlargements of great size, showing the activities of the British Royal Air Force on various fronts during the war. All the prints exhibited were remarkably well colored, which added to their effectiveness. It is to be hoped that we here in America may have the pleasure of seeing the work of our own photographic flying men in a similar exhibition in New York and other large centers.

THE LONDON SALON OF 1919 is announced to be held at the Gallery of the Royal Society of Painters in Water Colors, 5a Pall Mall East, London, S.W., from September 13 to October 11. The latest date for the receiving of exhibits has been fixed for September 2, and it is particularly desired that prints submitted by photographers overseas should be sent so as to reach the Secretary of the Salon in advance of that date. The prospectus and entry forms can be obtained from the Secretary of the Salon, addressed as above.

PICTORIAL PHOTOGRAPHERS OF AMERICA.—The annual report of this organization, recently received, has a very special interest apart from the report proper, in that it contains a stenographic record of a conversation with Clarence H. White, reported by Henry Hoyt Moore, of *The Outlook*. The conversation concerns the progress of pictorial photography in America, but incidentally tells us much of the ideals and methods of Mr. White himself. The report of the year's work is by Mr. E. R. Dickson, and the brochure is illustrated with examples of the work of Dr. A. D. Chaffee, Francis O. Libby, Bernard S. Horne, Laura Gilpin, Dwight A. Davis, John H. Garo, Lucy Van Wagenen and Henry Hoyt Moore.

OIL PRINTS.—An exhibition of oil and bromoil prints by Dr. A. D. Chaffee, James Capello, Alfred Cohn, Bernard S. Horne, Dr. Charles H. Jaeger and Doris U.

Jaeger, and William Gordon Shields, all of New York, was given a few weeks ago at the Washington Irving House, the home of the Clarence H. White School of Photography, New York. About fifty-two prints were exhibited, offering the pictorial worker an inspiring view of the possibilities of these printing methods as a means of artistic expression.

The May number of *Arts and Decoration* contains as its premier feature an illuminative article on "The Effect of War Upon Architecture," by John Wallace Gillies, of New York. After his review of the influence of past great wars upon the architecture of Europe, Mr. Gillies asserts his belief that the great war just ended will have a marked effect upon the architecture of America, giving it a distinct and national character.

The Honolulu Photo Supply Co. In the issue of *The Pacific Commercial Advertiser* of April 20, a special illustrated supplement is devoted to a photographic contest which marks the twentieth anniversary of the founding of the Honolulu Photo Supply Co., by Mr. John T. Warren, who still presides as the active head of this enterprising Hawaiian concern. The contest brought out all the pictorial talent of the territory, and the prize pictures offer abundant proof that the amateurs of that part of the world are in no way behind those nearer the great bases of inspiration and supplies. I was particularly glad to see, at the head of the account of the establishment and progress of the Honolulu Photo Supply Co., that its growth and success were attributed to the clean-cut honesty and fair-dealing policy of Mr. John T. Warren, a gentleman well known and much esteemed among American dealers and the trade. Here's wishing him many more years of health, happiness, and prosperity.

THE MARVELS OF PHOTOGRAPHY. By Charles R. Gibson. 222 pages, with many illustrations and a

frontispiece in colors. Philadelphia: J. B. Lippincott Co. Price \$1.75, postage 10 cents.

Among the popular lectures inaugurated years ago by the late H. Snowden Ward, none achieved greater fame than that which described the marvels of photography, showing some of the innumerable applications and uses of photography in science, the arts, and industries. Mr. Gibson, already known as the author of "The Romance of Photography," has in the volume under notice given permanent form to the records of this interesting field. Apart from its interest as a concise description of some of the most notable achievements of photography, the book should prove extremely useful to the increasing number of those who are seeking material for lectures or papers on this side of photography for societies and periodical publication.

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Stereoscopic Photography

The supreme excellence of photography lies in its ability to give a truthful record of the appearance of objects as our eyes see them. In the face of this, it may startle the gentle reader to learn that the everyday photography with which we are familiar does not employ this unique ability to its full capacity, and that, consequently, our photographs fall short—are incomplete and therefore imperfect—as truthful records of the subjects we photograph, as the eyes see them. Note that I say “as the eyes see,” and not *as the eye sees* them, as the loose phrase generally runs. The plural here has an unwonted significance, for we do not see things with one eye, but with two eyes, a fact which most of us completely overlook, or have forgotten if ever we realized it.

There is a big difference between seeing with one eye (monocular vision) and seeing with two eyes (binocular vision). And there is just as big a difference between monocular photography and binocular photography. The ordinary flat-print photograph, made with one lens, gives us a monocular record of the subject as it would appear if viewed with one eye; it cannot do otherwise. The stereoscopic or binocular photograph, which is a photograph combining the two slightly different picture-images obtained by photographing the subject with two lenses separated by the distance between the two eyes, gives us a complete and truthful record of the subject as we really see it—with two eyes.

The difference between these two records, and the incontestable superiority of the stereoscopic over the ordinary photograph, cannot adequately be expressed in words or types, but must be seen to be appreciated. To one comparing the two records for the first time, the comparison has all the force of a revelation. And if, by fortunate chance, the comparison be made of an ordinary photograph and a stereoscopic color transparency of the same subject, the sensation will be one of sheer wonder, as when one suddenly gets a glimpse of absolute perfection in any created thing. I am well aware that this may seem a vividly colored, stereoscopic view of the subject in hand; but if it persuades the reader to make an unprejudiced comparison for himself, I have no fear about his conviction as to the truth of the matter. In viewing the monochrome print it is impossible to get away from the fact that we see a record only, a representation of a solid object upon a plane or flat surface. In viewing the stereoscopic color transparency the perfect illusion of reality blots out all sense of the fact that we are looking at a record, and we seem to see the object itself.

It is usual, in the beginning of any **An Explanation** account of stereoscopic photography, to explain the principle of binocular vision, upon which the method is based, by means of a scientific paragraph with diagrams by way of illustration. Since, however, binocular vision is the natural vision we all possess and use, and stereoscopic photography is really a "getting back to nature" and not a departure, it will be sufficient to recall a few elementary facts about "seeing things" in general, to give the reader an intelligent grasp of this principle and its application in photography.

Of Seeing with One Eye First, as to monocular vision—seeing with one eye. When we look with one eye at any solid object, we perceive it in two dimensions only, viz., its length and breadth. The third dimension, i. e., its thickness, depth, solidity, or relief, escapes us. Test this by looking with one eye centrally at the face of a cube or an ordinary round bottle. Similarly, looking with one eye at several solid

objects in a group or scene, we are unable to perceive their separation by planes of distance or their relative position in space with regard to each other. Thus near and far objects appear, as in a picture, to be flat and piled up or pasted against each other, instead of standing out separately in relief as they actually do in the group or scene. It is true that, by the association of ideas, by our experience of differences in the size and shape of objects, and the illumination or light and shade effects, the brain tells us that the cube has depth and solidity, that the bottle has thickness and roundness, and that the several objects in the group or scene are separated by planes of distance. But the fact remains that this third dimension is not perceived by normal, unaided monocular vision.

Of Seeing with Two Eyes If, however, we look with our two eyes at a solid object or group of objects, as we normally observe them, the third dimension is added, and we actually perceive the depth, solidity, and natural relief of the objects, together with their relative positions and separation by planes of distance. This is the effect of binocular or stereoscopic vision, the word stereoscopic being derived from two Greek words: *stereos*, solid, and *scopeo*, I view. The explanation of this difference between monocular and binocular vision is simple. As the eyes are set horizontally in the head and separated by a distance of about $2\frac{1}{2}$ inches, so our eyes see two distinct and slightly different pictures of every object to which they are directed, the object being viewed from two different points. Thus the left eye sees more of the left side of the object and the right eye sees more of the right side of the object. These two similar but slightly different picture-images are blended or fused in the brain to form a single record of the subject in all its three dimensions, so that, in addition to perceiving the length and breadth of objects, we can estimate their depth or solidity, and appreciate their separation in space.

The Stereoscopic Method Stereoscopic photography, or stereography as it is latterly named, is simply a method of photography which follows the natural or normal way of seeing things with two

eyes, and which gives us a complete, three-dimensional record of what we see, as the eyes see it. The camera employed is usually one fitted with two lenses, set horizontally side by side and separated as our eyes are. Using this camera in the ordinary manner, two pictures of the subject are obtained, each from a slightly different viewpoint because of the separation of the lenses, representing respectively the two dissimilar pictures seen by the two eyes. Placed side by side in the form of positives on paper or glass, the two pictures are viewed in a stereoscope. This is a simple optical instrument in which, by means of lenses, prisms, or mirrors, according to its form, the two views are combined or merged to form a single record of the subject, just as the two retinal images are blended or fused in the brain, with the result that we obtain an exact reproduction of the subject photographed, as the eyes saw it when the photograph was made.

Let us here digress for a moment to

A Digression answer two questions which ask themselves at this point. When was stereoscopic photography first made known? And if it is indeed a better method than the one now commonly used, why has it not received the recognition and favor it so obviously deserves?

285 B. C. As to the first question. The principle
A. D. 1738 of binocular vision was explained and discussed by Euclid two thousand years ago. The first observation of its application to the obtaining of relief in the images of objects seems to have been made by Robert Smith, who published a record of his experiments in "A Compleat System of Opticks," two volumes, Cambridge, 1738. An interesting note about Robert Smith's observations, by Dr. M. von Rohr, may be found in *The British Journal of Photography* of June 10, 1904.

The Stereo- The first stereoscope was invented by
scope Sir Charles Wheatstone in 1838, for use in viewing geometrical drawings of solids, photography being at that time an undiscovered art. He seems to have first used photographic pictures with his stereoscope in 1845, about which time the

stereoscope was being used in France for the viewing of stereo daguerreotypes. In 1849 Sir David Brewster brought forward an improved stereoscope, and thereafter the new art of stereoscopic photography quickly attained world-wide popularity. During the early sixties and seventies, following the introduction of the familiar and convenient hand stereoscope by Oliver Wendell Holmes (1861), stereoscopic photography became, with the single exception of portraiture, the most widely known and practiced branch of photography, its popularity fairly rivalling that of the motion picture of today.

Many reasons have been advanced to account for the decline of stereoscopic photography in popular favor, and the neglect with which it has been treated for the past quarter of a century. It will suffice to mention two of these. When the stereoscopic picture reached the zenith of its popularity, the demand for records and stereoscopes grew to such proportions that their production necessarily passed into the hands of large commercial firms here and in Europe. Not only was it much easier and less expensive to purchase the pictures than to make them for oneself, but the commercial product offered an infinitely wider variety of subjects for the stereoscope. Why bother to make a stereographic survey of one's home town, when one could enjoy the unfamiliar delights of a stereoscopic tour in Egypt, India, or the Riviera for a song!

Now the perfect illusion of reality given by the stereoscopic method depends upon the careful following of certain optical principles, both in the production of records and stereoscopes or viewing instruments. And as stereograms and stereoscopes were commercialized and made cheaper, so they deteriorated in precision and quality, with the result that the special distinction and charm of the stereoscopic record were not always as forcibly apparent as they should have been. People lost interest, just as we do today when it is a case of phonograph and records of inferior manufacture, or poor photography and slipshod projection in the motion picture theater.

Then, too, the coming of the modern dry plate and more modern film, with the growth of amateur photography which followed these, all tended to the shelving of a method of photographing which demanded more carefulness and attention to detail than the methods popular today. As a result, stereoscopic photography steadily declined in favor everywhere, but especially in America and Great Britain. In France and continental Europe, however, where the earlier type of the enthusiastic and painstaking amateur still persists, the stereoscopic method is widely used and has been brought to a remarkable perfection in apparatus, methods of use, and results.

**How Simple
Is It?**

With this digression let us get back to our consideration of the principles and practice of the stereographic method. First, let it be understood that stereographic photography offers no special difficulties. It is not, indeed, as simple and as care-free a method as the elementary, snap-shot photography which today satisfies the majority of amateurs. You cannot simply press the button and have the finished stereograms handed to you within twenty-four hours by your newsman, the corner druggist, or the average dealer. As a matter of fact, I cannot mention half a dozen dealers in America to whom I would entrust the development and printing of my stereoscopic work. The "commercial finishers" of today, with very few exceptions, know nothing of the stereoscopic method.

**Compared
with Ordinary
Photography**

But to the serious amateur or professional, who naturally gives to a method promising superior results that intelligent carefulness its promise deserves, and who prefers to do his own developing and printing, stereoscopic photography will prove as simple in manipulation and as certain in results as the ordinary photography we know. Certainly it is not more exacting in manipulation than the autochrome color method, speed work, pictorial photography, and many similar specialties in which thousands of amateurs and professionals excel, and its mastery opens up a world more interesting than any of these.

**Stereography
in a Nutshell**

Put into a few words, stereoscopic photography consists in making two pictures of the subject corresponding to the two pictures our eyes see, and then the arranging or placing of these two similar but not identical pictures for viewing in such a way that they will blend, fuse, or unite to form a single picture, giving a record of the subject in all its completeness—as we saw it. It is a method of precision, giving records possessing desirable qualities which are lacking in the ordinary, flat-print photograph. Its manipulation is well within the capacity of any amateur who is willing to go beyond the “push the button” stage. For its practice we need only a “taking instrument” (camera) for making the negatives, a special form of printing frame for making and transposing the prints or positives, and a “viewing instrument” (stereoscope) for the blending or fusing of the two picture images in the single record.

**The Vital
Principle**

It is obvious, from what has been written thus far, that the vital point in all stereoscopic work is to secure absolute correspondence between the picture-images in the stereographic positives and those seen by the two eyes in looking at the subject. This is secured by the proper separation of the lenses used in obtaining the stereographic negatives, and especially by careful attention to the proper separation of identical points or objects in the stereographic positives in mounting or preparing these for viewing in the stereoscope. Reference may be found at the end of this monograph to several learned papers, bristling with mathematical formulæ, dealing with this all-important detail. Here I can make room only for the common-sense of the matter, as far as it concerns the average worker dealing with the general run of subjects.

**The Separation
of the Lenses**

The separation of our two eyes, from center to center, averages 64 to 65 millimeters, or about $2\frac{1}{2}$ to $2\frac{3}{4}$ inches. Theoretically, the separation of the lenses used in stereoscopic work (making the negatives) should be the same, measuring from center to center. As to this, however, a certain amount of leeway is permissible,

and in practice the separation, for stereograms of the standard size of $3\frac{1}{4} \times 6$ inches, varies from $2\frac{1}{2}$ to $3\frac{1}{4}$ inches, with $2\frac{5}{8}$ inches as the normal separation, lens center to lens center. As we shall see later, a much greater separation is employed for special purposes, but we need not concern ourselves with this departure for the present. It is important to note, that with regard to the separation of the prints or positives in mounting or preparing stereograms for viewing in the stereoscope, very little if any leeway is allowable, and the distance between identical points or objects in the two positives should be $2\frac{1}{2}$ or, at most, $2\frac{5}{8}$ inches. If the reader will keep this latter rule constantly in mind, and the necessity for an exact correspondence between the retinal and stereoscopic images, he will not fail to get satisfaction from his stereograms.

As far as the "taking instrument" or camera is concerned, thoroughly good stereoscopic photographs can be made with (1) an ordinary single-lens camera, (2) a "pinhole" camera, in which two carefully made needle holes take the place of the two lenses used in the regular stereoscopic camera, and (3) with a stereoscopic camera carrying two accurately matched lenses, and otherwise properly designed and equipped for stereoscopic work.

The first method, using a single-lens camera, is necessarily an indirect, more tedious, and roundabout method than the use of the regular twin-lens camera, offering no advantage except on the score of expense. It is limited to still-life, architectural and landscape subjects, necessarily excluding all subjects in which any change or movement may take place between or during the successive exposures required to obtain the stereoscopic pair. And it is obviously impossible to fulfil the stereoscopic conditions in two successive exposures with the camera held in the hands, so that a tripod, table, or other rigid support must be used.

If a small single-lens camera is used in this method, all that is necessary in order to obtain the two stereoscopic pictures is to provide some simple device by which the camera may be shifted $2\frac{1}{2}$ or 3 inches to

the right or left after the first exposure. There are several devices of this sort in the market. For example, the Kodapod will permit the shifting of the camera $2\frac{1}{2}$ inches from side to side, keeping the axes of the lens parallel; or the Primus or Stereo Simplex attachments made by Butcher (London) may be used. A very simple homemade attachment of this sort is a stout board of convenient size for a tripod head, with two holes separated by, say, 3 inches, for the tripod screw; or having a slot in which the tripod screw will slide, so that the camera may be moved $2\frac{1}{2}$ or 3 inches from side to side after the first exposure—always in a line parallel with the two holes or slot.

**Adapting
a Half-Plate
Camera**

If a half-plate ($3\frac{1}{4} \times 6\frac{1}{2}$, or 5×7) camera is available, this can be adapted for stereoscopic work by fitting a sliding panel to the lens front, so that the lens can be moved for the successive exposures. Thus the lens is slid about $1\frac{1}{2}$ inches to one side of the central line of the front and the first exposure is made, after which the lens is moved over to a corresponding position on the other side of the central line and the second exposure is made. The two stereoscopic negatives are here obtained on the one plate. In this method an opaque screen must be used to protect one-half of the sensitive plate while the other half is being exposed. This may be done by cutting a ferro-type plate so that it will form a central partition inside the camera, reaching from the frontboard to within $\frac{1}{8}$ inch of the face of the plate, and held in two notches or slots at the back of the camera. Or one may make a black cardboard mask, snugly fitting the back of the camera and pierced on one side with a rectangular aperture, $2\frac{7}{8} \times 3\frac{1}{2}$ inches, the inner edge of which must coincide exactly with the center of the camera back. This mask, of course, is fixed in position close to and in front of the plate, and must be reversed after the first exposure to get the second negative on the other side of the plate. All stereoscopic pictures, made with a single-lens camera by the devices above mentioned, must be transposed in preparing the stereograms for viewing.

**Brown's
Attachment**

The simplest method for obtaining the stereoscopic pair with a single-lens camera, however, is the use of an ingenious attachment invented by Theodore Brown and named Stereophoto-Duplicon. This is marketed in America under the name Ingento Stereo Attachment (Burke & James, Inc.). This attachment, which fits on the hood of the lens as a shutter does, consists of two silvered reflectors set obliquely to the hood of the lens, these receiving the image in the same way as two separate lenses would in an ordinary stereoscopic camera. Two smaller mirrors opposite the first pair, and at a proper angle, reflect the images from the first and present them to the lens, these being coincidentally conveyed to the focusing screen or plate as two images taken from the two points of view represented by the position of the first pair of mirrors.

The image is focused with the attachment in place and appears on the ground glass just as it will appear in the finished stereogram. To get each image in correct position, all that is necessary is to manipulate one mirror by means of a central thumb-screw. With this attachment no division or camera partition is needed, nor is it necessary to transpose the positives in preparing them for the stereoscope. The slight increase in exposure necessitated by the fact that the picture-images are reflected is so slight that it may be neglected in ordinary work, so that one may use the attachment fitted to a half-plate hand camera, and for subjects such as children, etc., in a good light wherein the movement in the subject is not very rapid.

**"Pinhole"
Stereograms**

It is sometimes said of the stereoscopic picture that it is a "mechanically perfect photograph," but that there can be no talk of art or pictorial effects in the stereogram. This because a prime quality to be sought in general stereoscopic work is abundance of detail and rigorously sharp definition in all details. Be this as it may, it is easily possible to secure stereoscopic pictures delightfully soft in definition, with a pleasing amount of atmospheric effect and good tone values by the simple expedient of using a "pinhole" camera in making the

stereographic negatives. Necessarily, with this sort of camera one is limited to subjects not including movement, on account of the length of the exposure required. But this admitted, the most satisfactory stereograms of quiet landscapes, architectural groups or details, statuary and still life subjects in general can be made with a "pinhole" camera, involving the least possible expense and trouble.

Camera and Method The "pinhole" camera may easily be made from a cigar box or even an ordinary half-plate box, with a central division or partition and two needle holes adjusted at the proper separation. The construction of such a stereo camera is fully described and illustrated in THE PHOTO-MINIATURE No. 27. An ordinary half-plate camera, with a stereo partition and a frontboard carrying the two needle holes instead of the pair of matched lenses, may be utilized in the same way with equal effectiveness. An acquaintance with the general principles of pinhole work is, of course, desirable before attempting the production of pinhole stereograms. No focusing is required, but a little practice in the use of guiding view lines marked on the top of the camera will be needed to facilitate the correct placing of the subject. With a rapid plate, the exposure for a subject comprising near objects and a distant scene (a typical stereoscopic subject), will vary from 4 seconds at 10 A.M. or 2 P.M. in June to 40 seconds at the same hours in November. The usual plate distance (i. e., the distance between the needle holes and the plate) advised is $3\frac{1}{2}$ to 4 inches, and the No. 10 needle hole for the most desirable definition. It should be noted that the positives printed from pinhole stereo negatives need to be transposed in preparing them for viewing in the stereoscope.

Stereoscopic Cameras For all-round convenience, capacity for every sort of subject, and general efficiency, the use of the regular stereoscopic camera offers the simplest, most direct, and satisfying way of producing stereoscopic pictures. This consists of an ordinary camera, which may be of the fixed-focus, folding focusing, or reflex hand camera form, or the familiar view camera, such as we use in

everyday work, except that the frontboard is wider than usual to accommodate two lenses horizontally, separated by $2\frac{1}{2}$ to 3 inches, and a dividing partition in the body of the camera, extending from the frontboard to the plate or film, to prevent the light from either lens spreading beyond the center line of the single plate or film on which the two stereo negatives are made. Thus the stereo camera is really two cameras in one. The lenses are equipped with shutters which operate simultaneously, so that the two halves of the stereo plate or film are exposed at the same time and receive the same exposure. In some stereo cameras the lens board extends the full width of the instrument. This insures greater rigidity. In other models the internal lateral partition is removable or folds up out of the way, and the frontboard is so devised that a single lens may be used in the usual position, so that the camera can be used as an ordinary camera if this is desired.

Many different forms of stereoscopic cameras may be seen in the pre-war catalogues of American, British, French, and German camera manufacturers. The great war, of course, has curtailed their variety somewhat, so that, in this country at least, our dealers do not offer so wide a choice as formerly. In the following pages will be found a summary of the principal models available, furnished by an expert stereoscopist thoroughly familiar with the market of today. The American stereoscopic cameras mentioned are, of course, obtainable from any dealer. If any difficulty is experienced in obtaining any foreign-made model desired, the reader is advised to correspond with the two principal importers of these instruments, A. Madeline, 503 Fifth Avenue, New York City, whose ample stock includes almost all the pre-war and current models; and R. J. Fitzsimons, 76 Fifth Avenue, New York City, the American agent for the Richard's Verascope (all models) and Glyphoscope.

The most popular American model
Stereo Kodak of today is the Stereo Kodak No 1,
which meets every requirement of the
stereoscopist at a moderate expense. It is, of course,
designed for roll-films, but can be adapted for the use

of plates where this is desired. The outfit gives pictures $3\frac{1}{2} \times 3\frac{1}{2}$ inches (standard size, when trimmed), is fitted with anastigmat lenses $f/7.7$ and stereo automatic shutters, and is suitable for all classes of work with the single exception of high-speed photography.

The stereo camera *de luxe* is undoubtedly the Stereo Graflex, used and commended by travelers, surgeons, home portrait and commercial experts as the best of this class of cameras at present available. Like all of the Graflex series, it is soundly built and will withstand any amount of hard usage and any climate. It measures, when closed, $8\frac{1}{4} \times 9 \times 8\frac{3}{4}$ inches, and makes two pictures on a 5×7 -inch plate. The shutter is the well-known Graflex multiple-slit focal plane, with speeds from $\frac{1}{8}$ to $\frac{1}{1000}$ second. The rising frontboard works on a rack and pinion. This camera differs from all other forms of stereo cameras in the method of focusing. In the hood at the top of the box are placed two prisms so adjusted that the hood becomes practically a stereoscope. When focusing, the operator sees but one image and that image right-side up and in all the realistic beauty of nature. As each half of the resulting negative measures $3\frac{1}{2} \times 5$ inches, it will be seen that the photographer may use the entire five inches of height in his final print or select from it such portions of the negative that please him.

The Stereo Graphic camera, made by the same makers, is an unusually compact folding box camera which appeals especially to all-round workers in that it can be used as a single-lens camera for 5×7 -inch pictures as well as for the standard size stereoscopic records. The interior partition in this model is a spring roller division which automatically adjusts itself to lenses of different focal lengths as the front is racked out. The front platform of the camera drops out of the way, thus permitting the use of short focus, which is often desirable in stereoscopic work. The shutter is the regular Graflex focal plane shutter. Hence this camera, like the Stereo Graflex, may be used for high-speed photography, as well as for every class of subject without movement.

A very compact camera, which may be used as a stereoscopic or panoramic camera at will, is the Goerz Stereo Tenax, for stereograms 45 x 107 mm. or $1\frac{3}{4}$ x $4\frac{1}{4}$ in. This model is collapsible, measuring when closed only $2\frac{1}{4}$ x $5\frac{1}{2}$ x $7\frac{1}{2}$ inches, is fitted with anastigmat lenses $f/6.5$, and has a special shutter of remarkable efficiency.

Another small camera, which can be carried in the coat pocket is the Stereophotoscope, made by Voigtlander (Burke & James). This gives stereograms 45 x 107 mm., or $1\frac{3}{4}$ x $4\frac{1}{4}$ in., and can be had fitted with anastigmats at $f/4.5$ or $f/6.8$, with a shutter having a wide range of speeds for different subjects.

For splendid efficiency, fineness of construction, and ability to stand rough wear and tear, the Verascope, a French stereo camera (of Jules Richard), is without question one of the most desirable in the market (R. J. Fitzsimons). This is obtainable in several models from Nos. 1 and 1A to No. 7, at prices varying with the quality and equipment of the instrument. It is very compact, built of metal, is of the fixed-focus type, and can be had for use with plates or film packs, or roll-film, or autochrome color plates—all 45 x 107 mm., and for those desiring stereographs of larger size, a special 7 x 13 cm. model is provided for plates or roll-films.

A less expensive stereo camera made by Richard is the Glyphoscope, for plates 45 x 107 mm., fitted with achromatic lenses of $2\frac{1}{4}$ -inch focus, so that no focusing is necessary for objects more than 10 feet away. The front part of this instrument can be removed and the camera used as a stereoscope or viewing instrument.

Another French camera is the Ontoscope, obtainable from A. Madeline, New York. This is an all-metal camera for pictures 45 x 107 mm., fitted with Berthiot Steller Anastigmats, working at $f/4.5$, so that it is suitable for all classes of work. The instrument is beautifully made, and has a rising front and focusing adjustment.

**Other
European
Cameras**

The German-made stereo cameras, such as the Palmos (Zeiss), Heliar-Reflex (Voigtlander), Stereo-Panoram (Voigtlander), Nanna I (Mayer), Polyscope and Sterex A (Ica), Stereo-Binocular (Nettel), and Klapp (Ernemann) have not been obtainable here during the war, but they will doubtless again be on the American market before long.

The French cameras, Spido (Gaumont) and Block-note, and the several English models, such as may be seen by consulting the *British Journal Almanac* for the years 1912 to 1914, are not directly represented in this country, but can be imported by such agents as A. Madeline, 503 Fifth Avenue, New York City, from whom particulars may be obtained.

In preparing positives for viewing in the stereoscope, it is absolutely essential, as already mentioned, that the prints shall be so mounted that a distance of $2\frac{1}{2}$ or $2\frac{5}{8}$ inches will separate any two identical points or objects in the stereoscopic pair. This requirement determines the possible sizes of stereoscopic pictures, and incidentally of the plates or films used in making them. It does not matter how tall (from top to bottom) the stereographic positive may be, but the width of the plate used should not much exceed twice the separation of the lenses in use. The standard American size is $3\frac{1}{4} \times 6$ inches for the trimmed stereoscopic positives, and for this size of pictures we may use plates $3\frac{1}{2} \times 7$, 5×7 , or 5×8 inches, which will allow for trimming. The modern French and German cameras are, however, made in sizes smaller than that hitherto regarded as standard, viz., in 45×107 mm. ($1\frac{3}{4} \times 4\frac{1}{4}$ in.), 7×13 cm. ($3\frac{1}{2} \times 5\frac{1}{2}$ in.), and 6×13 cm. ($2\frac{3}{8} \times 5\frac{1}{4}$ in.). Plates and films for all the sizes mentioned can be obtained on both sides of the Atlantic without difficulty.

For viewing stereographs larger than the standard size, such as are used in some scientific applications of stereoscopy, stereoscopes of special form and construction are employed: for example, the Wheatstone reflecting and Pirie prismatic stereoscopes. These do not concern the average worker and his needs.

**Relation of
Taking and
Viewing
Instruments**

The principle of the stereoscope or "viewing instrument" is the reverse of that of the camera or "taking instrument." In order to obtain true stereoscopic effect, without exaggeration or distortion, we must present to the eyes, in the stereoscope, views exactly corresponding to the two direct retinal images of the subject, as seen when the photograph was made. This means, among other things, that the focal length and separation of the lenses in the stereoscope must be the same as those in the stereo camera or "taking instrument." This condition is fulfilled in the little Glyphoscope referred to, where one simply slips off the shutters and, placing the stereographic positive in the place previously occupied by the plate in the making of the negative, views the picture through the same lenses with which the stereo negatives were made. In most cases, however, this utilization of the "taking instrument" as a "viewing instrument" is inconvenient or impossible, so that separate "viewing instruments" or stereoscopes are generally employed.

**Stereoscopic
Vision**

It is possible to see the true stereoscopic effect in binocular pictures without the aid of a stereoscope. The stereoscope merely assists the eyes to join the two pictures, and if the eyes can do this without such aid, the stereoscopic effect is still obtained. This ability to see pictures in relief is attained by training the eyes to look at the picture with their axes parallel—that is, as though they were looking at some distant object. A very little practice is necessary to attain this, and once got, the faculty is not lost. On the margin of a sheet of paper or card make two marks about $1\frac{1}{4}$ inches apart thus:



Hold the card with the dotted margin uppermost and facing the eyes, about a foot in front of the face. Look steadily just over the edge of the card at some object about 20 feet away and then raise the card so that it intercepts the vision, but keep the eyes steadily focused at the 20-foot distance. Instead of two dots there

will appear four dots, and the two central ones will approach until they coalesce. There will then appear to be three dots, and the eyes will be fixed on the central one. When this can be easily accomplished, repeat the experience with two dots rather farther apart, and gradually increase the width of the dots until two dots which are $2\frac{1}{2}$ inches, or a little more, apart can be united. If for the dots we now substitute a stereo-

gram, we shall obtain true stereoscopic coalescence.

We can now turn to the apparatus used for properly viewing stereoscopic pictures. This "viewing instrument" or stereoscope, as it was named by its inventor, Wheatstone, has already been mentioned on an earlier page.

The Wheatstone stereoscope consisted of an arrangement of two small mirrors, placed at such an angle that by the proper adjustment of the two separate pictures and the eyes of the observer, the merging of the two images into one, giving the desired illusion of solidity or relief was accomplished by reflection. Hence it was known as a reflecting stereoscope. It is not used today except for the viewing of large stereographs as in stereo-radiography and applied science.

The improved stereoscope invented by Brewster was lenticular in principle, the mirrors employed by Wheatstone being replaced by lenses. In this form of stereoscope the two picture-images of the stereogram are fused or combined by refraction instead of by reflection. It was usually enclosed in a small box of neat design and was the popular viewing instrument of our grandfathers' mid-Victorian days.

Many attempts to improve on Brewster's stereoscope were made, of which one of the most interesting was consummated in the prism-reflecting stereoscope introduced by Grubb. In this two right-angle prisms were employed instead of lenses, the stereoscopic effect being secured by reflection.

The Holmes' Stereoscope

This was followed by the convenient hand stereoscope invented by Oliver Wendell Holmes, which has enjoyed world-wide popularity since its introduction nearly sixty years ago, and with the form of which the reader is doubtless familiar. In this stereoscope we have simply an upright screen holding two lenses and surmounted by a hood. This is fixed to a track which extends at right angles from the lens screen for a distance of about 9 inches. An adjustable vertical frame is attached to this track, into which the stereoscopic print is placed so that it faces the two lenses. Holding the instrument as close to the eyes as the lens-hood will permit and looking through the lenses, the stereograph is focused until the combined image is seen to be perfectly sharp, when the stereoscopic effect is completely obtained.

The Lothian Stereoscope

The most desirable form of the Holmes' instrument is the Lothian stereoscope, made by Baird, Edinburgh, and not so widely known in America as it deserves. This instrument is neat in design and collapsible, so that it can be folded away when not in use. It is almost wholly made of metal; the lenses are adjustable as to their separation, and lenses of variable foci may be used when this is desired.

Brown's Pocket Stereoscope

A very simple and useful pocket stereoscope, not obtainable in this country, is that invented by Theodore Brown. This is no larger than a watch-maker's eyeglass which in appearance it resembles. It is fitted with two reflecting mirrors instead of a lens, stereoscopic effect being obtained by double reflection. With such a stereoscope, stereoscopic records pasted in books or used as book illustrations may be viewed, or the stereogram can be held in any position convenient for its proper observation.

A Folding Stereoscope

Richard, of Paris, also announces a convenient folding stereoscope too simple for description. This may be had from R. J. Fitzsimons, the American agent for the Verascope, whose address I have already given.

Viewing In almost all the stereoscopes described, only paper prints can be viewed
Transparencies and if the stereogram is a positive on glass (the ideal form of the stereoscopic picture), we must use a modified form of the box stereoscope, with its bottom fitted with ground glass, in order to view the glass positive by transmitted light. The French excel in the production of stereoscopes of this form, the familiar Richard Verascope-Stereoscope offering several desirable varieties. One of these is fitted with prisms which automatically reverse the picture-images, which obviates the need of transposing the stereographic pair in stereograms to be viewed in this instrument.

Finally, we have the perfect stereoscope in the Zeiss Verant Stereoscope, an instrument of remarkable precision, which corrects any distortion or unnatural perspectives in the stereogram due to the use of lenses of abnormally short focal length. It is suitable for the viewing of both prints and glass transparencies.

Practice In practice, stereoscopic photography differs very little from the everyday photography we know—at least as far as making the negative is concerned. It is adaptable to almost every sort of subject, indoors or out of doors, and for every purpose to which ordinary photography is applied, whether for pleasure or profit. It is unrivalled in its revelation of detail in the shadows of subjects, wherein monocular or single-lens photography is apt signally to fail. And, naturally, its peculiar advantages are best displayed where the presentation of the relief or perspectives of the subject will add to the charm, interest, or usefulness of the photograph.

Lenses A few points which need attention may be mentioned here with profit.

Where the twin-lens method in general use is employed, it is important that the two lenses shall be accurately matched or paired, so that they may be exactly alike in focal length, rapidity, and similar qualities. This is necessary in order to secure in the stereogram images identical in size and brilliancy. Usually the lenses chosen for stereoscopic work are of short focal length, as giving greater depth of focus and a

wider view angle than those of the focal length normally used. Great rapidity is not essential or desirable except for portraiture and high-speed work where movement is concerned, as in photographing sports.

Choice of Subjects In the choice of subjects it is usual to prefer those in which the receding dimension is conspicuous. This applies with equal force to the choice of the point of view in photographing any subject. For the same reason it is desirable, in outdoor scenes or in an interior having unusual depth, to secure a strong foreground in order to enhance the effect of relief and distance in the view. The use of a figure is common in outdoor work and very effective. In a scene possessing normal depth the figure or near object used for this purpose should not be more than 20 or 30 feet from the camera. In an interior with less than normal depth, the nearest object may, with advantage, be within 10 feet away from the camera. This device is, of course, chiefly employed in stereoscopic work done for the pleasure of viewing the subjects in the stereoscope. In educational, industrial, or commercial work it is rarely considered.

Lighting of the Subject Similarly, in the illumination and general treatment of subjects, these should always be directed to the obtaining of pleasing light and shade effects, as adding to the attractiveness of the perspectives and the illusion of relief. This applies with special force to architectural and interior work, wherein the lighting of the subject has much to do with the success or otherwise of the result. In lighting, harsh and contrasty effects are undesirable; hence a fairly soft and subdued light, with a full exposure, which will produce soft prints with an abundance of detail should be sought.

Level the Camera In making stereoscopic pictures it is of prime importance that the camera be level. With the reflecting type or with the stand camera, both of which allow the operator to view the object on the ground glass before making the exposure, this is not difficult; but with the hand camera, using a finder, one must watch closely lest he get the horizon line out of alignment. I mean by this that the

camera must be level at right angles to the axes of the lenses; the front may be tipped a trifle up or down to cut out or include the foreground, but the camera must not be tilted from left to right or vice versa. The longitudinal lines in each picture must be the same distance from the top or bottom of the plate, and we shall see the importance of this when we come to the printing of the negatives in the transposing frame.

As far as exposure is concerned, it is better to err on the side of over-exposure than to under-expose. Thus a dull and hopelessly flat photograph will often show to great advantage in the stereoscope, while the brilliant and contrasty prints resulting from slight under-exposure are rarely satisfactory.

In development, as in exposure, softness and detail are the two qualities most desired in the stereoscopic negative. The reader may safely use his favorite developing agent and special formula, provided he can adapt it to securing the two qualities mentioned. My personal preference is for pyro-soda and the tank method as advised by Dr. Nathan T. Beers in the following formula:

Solution A.—Water, 16 ounces; oxalic acid, 10 grains; pyrogalllic acid, 1 ounce.

Solution B.—Water, 16 ounces; Eastman's sulphite of soda, 2 ounces.

Solution C.—Water, 16 ounces; Eastman's carbonate of soda, 1 ounce.

For use, take one ounce each of A, B, and C and 7 ounces of water. For double-coated plates use 14 ounces of water. The factor is 12. For tank use take 1 ounce of each solution and 32 ounces of water at 65° Fahr. and develop for 25 minutes.

All the advantages which stereoscopic photography offer, as compared with ordinary photography, are intensified in its application in high-speed work or the making of stereoscopic records of subjects including rapid movement. Thus well executed stereograms of children at play, animals, birds in flight, water in all its forms of

**High-Speed
Stereoscopy**

motion, as in wave and surf photography, waterfalls, fountains in action, and rippling streams, and especially all sorts of outdoor sports, have an interest and fascinating realism in the stereoscope which no single-lens record can approach. Similarly stereograms of horses and farm stock, the mechanical operation of manufacturing plants, or of the finish of a race or other athletic event, have a much larger interest and value, by reason of the analysis of movement presented, than exists in the single-lens or monocular record.

**The Camera
and Shutter**

In dealing with subjects of this class, wherein the movement is not excessively rapid, any stereoscopic camera fitted with lenses working at not less than $f/8$ and shutters capable of exposures up to $\frac{1}{150}$ second, will give good results under favorable light conditions. But for high-speed work, where very rapid motion is involved, a focal-plane shutter and lenses working at $f/6.3$ or better are indispensable. An ideal equipment of this sort is the Stereo Auto Graflex, for stereograms of the standard size. If the expense of this outfit is beyond the reader's purse, I may point out that any half-plate or 5×7 folding camera fitted with a focal-plane shutter may be adapted for the work by equipping it with a removable stereo partition and a lens board carrying a pair of matched lenses. As these need not exceed 4 or 5 inches in focal length, sufficient to give a reasonably wide view angle on the halves of the stereogram they have to cover, there will be a slight saving.

**Manipulative
Points**

With regard to manipulation, this does not differ from that usually employed in high-speed work, except that it calls for special skill in visualizing the size which the moving object, such as the figure in any outdoor sport, will have at the position chosen for exposure. Care is needed, too, in holding the camera perfectly horizontal, and to see that all the figure is included in the limits of the picture-image. Working, necessarily, on a somewhat small scale, the exposures in high-speed stereoscopic work will, as a rule, be less rapid than are required with the single-lens camera giving images of larger size in the larger picture space.

**Stereoscopic
Portraiture**

If ever the oft-heralded revival of popular interest in stereoscopic photography arrives, it is safe to prophesy a general use of the method in home and garden portraiture of the modern sort, wherein the conditions are naturally favorable to the display of its peculiar advantages. It would be difficult to imagine anything more charmingly realistic than figure and group portraits, made out of doors and presented in the form of stereo color transparencies. To those who are adept in the use of autochrome plates, this work offers little or no difficulty. I recall a series of portraits and outdoor groups of this sort, made by Mr. Charles H. Davis, of New York City, during an Italian holiday in 1914. He found his subjects in the beautiful gardens of the hotels which dot the shores of the Italian lakes. The compositions generally included prominent figures in the foreground, with lake, hills, and sky in the middle distance and background. Viewed in the stereoscope, they offered a veritable re-creation of the scenes portrayed, with all the glow of life and movement, sunlight, color, and perspectives of the scenes themselves. Mr. W. B. Stage, another New York professional, has also done some remarkable work in stereo color portraiture. The examples I have seen were at-home and studio portraiture, apparently made by artificial light, notable for brilliancy of color and vivid reality.

The Camera In stereoscopic portraiture, whether in monochrome or color, the use of a stereoscopic camera, *i. e.*, one fitted with twin lenses and otherwise equipped for this work, is preferable to any attempt to make separate exposures with a single-lens camera. This simply because slight variation in the exposures, movement on the part of the subject, or alteration in the illumination of the subject, such as may occur, in successive exposures with a single-lens camera, will be fatal to successful effects in the stereoscopic portrait.

**Lens
Separation**

According to the rule that the nearer the object to the camera, the less the separation between the lenses, the distance separating the lenses in making the average

portrait will rarely exceed $2\frac{1}{2}$ inches, this distance giving the most natural relief in the print. Where the separation of the lenses is not adjustable, this detail may be neglected.

In the case of bust portraits, a plain
Bust Portraits and fairly dark background is advised.

Where such a background is employed, the effect of roundness or relief can be exaggerated and the head made to stand out solidly in space with the background well behind it, by masking the two prints in printing, so that the head in the left picture is a little to the right of the center of the background, and in the other a little to the right of the center, the two backgrounds being, of course, of the same size and shape in each picture.

Generally speaking, however, three-
Figures quarter and full-length figures are more effective than bust portraits in stereoscopic work. This arrangement permits of the introduction of accessories in the composition, which may add to the effect of stereoscopic relief in the portrait. For example: in an outdoor group we may introduce a small table set for luncheon or tea; in a portrait of a chemist may be included a group of technical apparatus on the laboratory bench at which he stands or sits; a child may be busied building a house of cards.

A full-face portrait, or one where the
The Eyes sitter looks directly at the camera, is rarely as effective as one where the subject is shown in three-quarter face or looking away from the camera. This because it is difficult to secure a pleasing expression where the sitter attempts to look into two lenses at once. It should be added that, in stereoscopic portraiture, no retouching is permissible, since the marks and surface improvements added by the hand or knife of the retoucher stand out, in mid-air so to speak, when the positive is viewed in the stereoscope. Since the stereo portrait should be fully exposed, well modeled in its illumination and generally soft in definition, the lack of retouching will seldom be noticeable and, as a matter of fact, will often add to the speaking character of the portrait.

Whether the necessity of using a
An Objection stereoscope to view the stereoscopic portrait will prove an insurmountable objection to a revival of stereoscopic portraiture today is a question which can only be answered by a practical test of the matter. In the case of the stereo color portrait made on an autochrome plate, I think the objection will not prevail, since a viewing instrument is necessary with any autochrome picture. Where stereoscopic portraits in the form of prints are offered, the presentation of a simple, inexpensive stereoscope with the finished portraits would seem to offset the difficulty.

An interesting application of stereo-
Boissonnas's graphy in portraiture, which does not
Binocular seem to have attracted the attention it
Portraiture deserved, was the "binocular portraiture" of M. Fred Boissonnas, of Geneva, described and illustrated in *The Amateur Photographer*, July 26, 1901. This method gave, in a single print, a softly defined (somewhat unsharp), plastic image of the subject, with considerably greater relief than we get in the ordinary photographic portrait. Perhaps the "fuzziness" of the binocular portrait left the public of its day cold to its merits, but today, when the soft-focus lens is so generally used in portraiture of the better sort, this feature would not be considered an insuperable objection.

The essence of Boissonnas's method
The Method was to unite upon a single plate the two elements of the stereoscopic portrait. Necessarily, this attempt to make the two different images coincide produced a certain degree of confusion or unsharpness, more especially at the vertical boundaries of portions of the portrait; but M. Boissonnas contended that this was a necessary incident of binocular vision, and that being thus naturalistic or realistic, tended to a true representation of the subject.

It appears that M. Boissonnas under-
Its Origin took his experiments in this specialty as a result of the views put forward by M. Darier, a portrait painter of repute who, as far back as 1888, had published a paper pointing out that

the works of the masters in painting were executed with an appreciation of the fact of binocular vision, and that the outlines in their works are multiple according to the exigencies of binocular vision. The relation of this brought forward a reference to the method invented or followed by Mr. Smee, at some date prior to 1854, for the production of binocular photographs, "by moving the camera, during the exposure, the width of the two eyes or about two and a half inches, upon an axis revolving from the plane of right or focal adjustment; producing upon the single plate a roundness, breadth, and reality singularly beautiful, compared with which the ordinary photograph appears flat and meagre." The particular movement to be made by the camera during the exposure is said to be easily attainable by means of a device or contrivance put forward by Mr. Latimer Clark, which is described and illustrated in Hardwich's "Photographic Chemistry," seventh edition, at page 466. Unfortunately I have not a copy of this work at hand, so that I am unable to verify this detail.

Referring further to his method, M.

The Result Boissonnas says: "In the binocular portrait, the central portions of the two images can be superimposed without any appreciable duplication of the finest lines, but in proportion as we approach the periphery, a duplication of lines becomes apparent and exact coincidence is impossible. Contours then become softened, sharp edges are toned down, and hard features are modified, so that a profile which would otherwise look as if cut out in sheet metal becomes plastic in character as if stamped. . . . The drapery is at the same time simplified as the texture disappears, while the more essential characteristics become more pronounced."

Stereo Photo-Micrography Although the modern development of high-power microscopical and photo-micrographic research has tended to the neglect of the use of the stereoscope in these branches of scientific work, the many advantages of the stereo photo-micrograph are well known to workers in these fields. In photo-micrography the binocular microscope

is especially useful in dealing with objects or minute structures not requiring a higher magnification than 100 to 150 diameters. The reader who desires to look further into this specialty is referred to its detailed treatment in the "Handbook of Photo-Micrography" by Hind and Randles, and "Practical Photo-Micrography" by Barnard.

Stereo Radiography In anatomy and medical and surgical photography, the use of stereoscopy is every year becoming more general as offering advantages not obtainable by ordinary or monocular photography. The principles of stereoscopy as applied in X-ray work give records conveying a sense of solidity and of the relative positions of objects quite impossible to obtain from a single view. The stereo radiograms, as they are called, are generally negatives of any convenient size up to 10 x 12 inches, the definition or detail showing with greater precision in a negative than in a print. For viewing these stereo radiograms a reflecting stereoscope, such as that invented by Wheatstone, or a double reflecting prism instrument, such as Pirie's stereoscope, is used, but in many instances the roentgenologist is trained to study the stereo radiogram direct, that is without the use of the stereoscope. For details of the methods and apparatus employed in modern practice of this sort the reader is referred to "Practical X-ray Work" by Drs. Arthur and Muir, a second edition of which was published in 1917.

Printing the Positives We now come to the printing of stereograms and their preparation for viewing in the stereoscope. Here we encounter the only difficulty peculiar to the stereoscopic method. Unless the viewing stereoscope is one provided with inverting prisms (and there are few models of this sort), it will be necessary to transpose the two picture-images of the stereo negative in the printing or mounting of the stereogram.

Necessity of Transposing The reason for this necessity of transposing the two halves of the stereo pair is simple and easily understood. As everyone who has seen the picture-image on the ground glass of the camera knows, the camera inverts

the image (turns it upside-down) and at the same time reverses it as to right and left. In the case of the single-lens negative, we simply invert the print when we take it from the negative and so view it correctly. In the stereo negative, the fact that there are two images side by side introduces a complication, and the mere inverting of the print does not straighten things out. Thus, when we print the stereo pair on a single piece of paper from a single negative, i. e., where the two stereo negatives are on one plate as usually made, we get the picture seen by the right eye (in looking at the subject) on the left side in the print, and that seen by the left eye (in looking at the subject) on the right side of the print. If we put such a print in the stereoscope we would fail to get the illusion of relief, because we would be looking at the pictures from positions opposite to those from which they were taken. To get the illusion of relief or stereoscopic effect, we must have the "right" picture on the right side of the print and the "left" picture on the left side of the print.

**Methods of
Transposing**

This is done very simply by either cutting the negative in two and transposing the halves before printing, or by using a transposing printing frame and thus transposing the prints during the printing. Or we can print from the whole stereo negative, cut the halves of the print and transpose them in mounting, after trimming each half. But this method is now obsolete. These methods of printing are briefly as follows.

**Transposing
by Cutting
the Negative**

In the case of films, this method is not difficult. With plates, one must exercise skill and there will be many broken negatives and especially those which are most valuable. To cut the glass, procure a good glass-cutter (a diamond is preferable, but a good wheel cutter will answer). Lay the negative on a flat surface. With a swift and certain draw, cut (do not simply scratch) the glass along a line about 2 millimeters from the inside border of each picture. Now turn the glass over and tap, with some force, along the lines cut, with the back of the glass-cutter; this serves to break the glass along the cut more deeply. Now,

grasping the negative on the right with the right thumb and forefinger (thumb on top of the negative), and the left portion of the plate similarly over the other cut, give a sudden bend downward which will snap the glass along the cut surface. It is better, when larger sizes of negatives are used, to hold the glass nearer one border of the plate than towards the center, so that the breaking will begin at the edge and proceed thence across the plate. Repeat the process with the left negative. You have now three pieces of glass: (1) Right-hand negative; (2) left-hand negative, and (3) a middle piece, varying in width according to the size of the negative plate used. With a 45 x 107 mm.-plate, the middle portion is 1 centimeter for the Verascope negatives and for all others in this size, 17 millimeters. For a 7 x 13 cm.-plate and larger, there is no middle piece, owing to the fact that the two negatives come into juxtaposition. For the printing, one may secure a special frame to hold the cut negatives, a positive plate or paper being placed over the negative.

**Transposing
by Cutting
the Positive**

This is to be recommended only when one can not do otherwise. The positives are to be cut according to the scheme given for the negatives, after the positives are printed by contact in the ordinary way. In mounting, one must exercise great care in spacing and in orienting the negative prints so that the axes are exactly parallel and spaced so that the centers of the positives are exactly 65 millimeters apart.

**Transposing
without Cutting
Negative
or Positive**

This is by far the easiest method and one which will insure 100 per cent success. One may secure one of the Kodak self-transposing frames into which the negative plate is placed, *film side up* and shoved as far as possible to the left; then a plate or paper for the positive is placed *film surface down* upon the negative and shoved as far in the opposite direction (right) as one can. The cover is then carefully fastened down, which permits the springs to fasten against the paper or positive plate and hold it in place during the printing. After one has exposed the frame with the window side towards the light for a given time, the

frame is taken again to the darkroom, or the light is turned off and the frame is opened. Remove the positive, and *without changing the axes*, let the negative plate slip down to the right as far as possible and replace the positive, this time as far as possible to the left. You are now ready for the *second exposure, which must equal, as exactly as possible in time, the first exposure*. On developing, you will find the two images counterparts of each other, properly transposed and ready for viewing after washing and drying in the usual way.

**The Ernemann
Reversing
Apparatus**

A very suitable apparatus for transposing, where the size of the negative differs from that of the positive which is desired, is the Ernemann Reversing Apparatus. The negative, inverted, goes into one end of the apparatus, the positive plate, bromide, or gas-light paper into the other; the apparatus is closed (shutters being provided for the purpose) and the exposure is made once for all. The apparatus may be had for all standard sizes of plates and positives.

**Transposing
and Enlarging
Cones**

Jules Richard manufactures a printing and enlarging cone which resembles the familiar "Brownie" cone in shape. The upper part of the cone is arranged to take the camera (Verascope or Glyphoscope) and into the lower and larger portion one places the positive plate or paper. The 45 x 107 mm. image is enlarged to the standard size 7 x 13 cm. Other cones, simply for enlarging, are offered by the same firm.

**Group Viewers
and Storage**

After one has obtained his positives, he may store them in the manner of lantern slides, if they are prints on glass, or if on paper, in manila envelopes. The smaller sizes (45 x 107 mm., and 7 x 13 cm.) may be stored in one of the so-called "American Type" stereoscopes,

**"American"
Stereoscopes**

which is a cabinet provided with two chains upon which the plates or paper prints are fastened and, by means of a thumb-knob, the pictures are brought in their turn in front of a pair of lenses for viewing. This arrangement insures freedom from dust and scratches from handling when a hand stereoscope is used. One may

have several chains, the 45 x 107 mm. size holding 50 slides for each chain.

The Taxiphote of Jules Richard is a **The Taxiphote** modification of this scheme whereby the positives are stored in small boxes in drawers (3 to 12 being provided for the outfit) each drawer holding 25 positive plates. A box without cover is placed upon the platform within the stereoscope, immediately below the lenses, and an ingenious apparatus consisting of a lever arm grasps whatever plate is desired and brings it into place ready for viewing before the stereoscope lenses. On lowering the lever used for the purpose, the positive is dropped back into its proper compartment in the box. A disc is provided on the left side of the stereoscope, which indicates the number of the compartment in the box which is being engaged by the lever arm. One is thus enabled to pick at will whatever view he desires, a list of the views in their proper numerical order being given on an accompanying card for each box.

Development of Positives For the stereo positive, if on paper, there is nothing better than diamidophenol or amidol. For the positive transparency, if a black tone is desired, use any hydroquinone developer suited for plates. For warm tones, dilute this 1 to 4 and use double the amount of potassium bromide advised for negatives.

Stereo Transparencies With the small stereo cameras making negatives $1\frac{3}{4} \times 4\frac{1}{4}$ inches, one may purchase a transposing printing-frame to fit this size of plate, and this frame serves in making transparent glass stereographs as well as paper prints. The process is the same as described above for the Kodak self-transposing frame. Any of the plate manufacturers will supply the transparency plates. The following formulæ have proven very satisfactory in developing transparencies. Developer for Black Tones in Transparencies: Solution A.—Pure water, 24 ounces; dry sulphite of soda, 3 ounces; hydroquinone, 150 grains.

Solution B.—Pure water, 16 ounces; potassium carbonate, 2 ounces; bromide of potash, 15 grains.

To use, take of A 3 ounces; and of B 2 ounces.

Developer for Warm Tones in Transparencies: Solution A.—Pure water, 16 ounces; hydroquinone, 50 grains; dry sulphite of soda, 50 grains; bromide of potash, 24 grains; citric acid, 6 grains.

Solution B.—Pure water, 16 ounces; potassium carbonate, 480 grains.

To use, take equal parts.

An ordinary acid fixing-bath answers all requirements for fixing.

A Point in Trimming

There is one point of interest in trimming separate stereo prints for mounting about which I would like to speak. In order to enhance the plastic effect, we are in the habit of trimming the prints so that more of the right-hand margin and less of the left-hand margin shows in the left print, while the right-hand print should show more of its left-hand margin and less of its right. In practising this "dodge" we are simply following out the law of binocular vision. You will readily perceive the reason for this by trying the following experiment: Stand a few feet from a window and gaze at the view outside. Now close the left eye and then the right, and you will observe that with the left eye shut you will see more of the left side of the view, and with the right eye shut you will see more of the right side of the picture. The self-transposing printing-frame takes care of this automatically, as it were, and it is only spoken of here for the benefit of those who wish to trim and mount their prints separately.

Mounting If our prints are from negatives made with a stereoscopic camera of standard size and the prints have been transposed

in the printing, the process of mounting them is exactly similar to the mounting of ordinary photographs. There is a standard size of mount, about $3\frac{1}{2}$ x 7 inches, which properly fits the average commercial stereoscope. When the stereoscopic pair are obtained from two separate negatives, care must be taken to transpose the prints in mounting. It is important to set the pictures absolutely level on the mount, and to so trim them that there is a space rather less than $2\frac{3}{4}$ inches between any two similar points in the foregrounds. This separa-

tion, of course, must in any case agree with the separation between the lenses used in making the negatives. This detail is provided for when the self-transposing, printing-frame adapted to the size of camera in use is employed, but is worth noting as a precaution.

Of the methods for reproducing subjects in the colors of nature with more or less faithfulness which have been suggested or used in stereoscopy, perhaps the most readily followed method at the present time is the autochrome of Lumiere. While we experience the difficulty of having to look through starch grains colored to the three primary colors, it takes but little experience to put this disagreeable factor in the background and to learn to enjoy the faithful rendering of the various colors. In stereoscopy, the difficulty with the starch grains is magnified, since the viewer increases their size, but the difficulty is readily overcome even in this case. The difficulty of the nature mentioned is greater in the case of other methods of color copying, such as in the Paget Color Plate, where the cross-hatching is especially insistent, being a regular pattern and not a continuous one, as in the autochrome. The color paper prints of the Hess-Ives method are well adapted to stereo photography, even if the method is somewhat cumbersome as compared to the autochrome process. While the kodachrome method does not utilize all the primary colors, yet this method, which is simpler, can be adapted to photography in the three planes of space.

Stereo Autochromes The autochrome must be slightly over-exposed for successful use with the stereoscope viewer, as in the making of lantern-slides. One will, therefore, take the actinometer reading and increase the exposure about 5 per cent. The formula of 1 second at $f/8$ at midday in summer, which is given in the instructions for this plate, should read, for the stereo photographer, about $1\frac{1}{20}$ to $1\frac{1}{10}$ seconds' exposure. The development should be the same as for the exposure given for the plates by the makers. To avoid frilling and green spots on the plates, one should soak the plates before development in

a saturated solution of common alum. The writer has used to advantage a bath of potassium bromide and sodium hydrogen sulphite (given in the *British Journal Almanac*, 1916). In washing the two solutions just mentioned from the plate preparatory to development always use *running* water, for one gets green spots and frilling, and unequal development in standing the plate in water which is not running.

The autochrome has its limitations
 Selection of Subjects in stereo photography more than in ordinary photography. Objects with decided contrast of sunlight and deep shadow are seldom successful. Gray days are autochrome days for the stereo photographer. Mountains are easily left entirely off the plate when the exposure is made so that the intervening valleys are given their proper exposure. A child sitting on a red oriental rug in the sunlight, with the deeper shade of the surrounding room is not a pleasant object, the rug giving the appearance of being white and red, the white being the over-exposed red of the rug in the sunlight. When viewed without the stereoscope, the decided contrast does not appeal to one to such an extent as when he uses the enlarging viewer. Pleasing objects are open vistas with woodland in the background; a river, taken from one bank and the view directed at an angle down or up the current, taking in the bordering woods and shrubbery; a flashlight of a room with rich upholstery, where the illumination is the diffuse light of the north; portraits; hills and mountains, where heavy white and steel-blue cumuli clouds protect the summits from the sun's glare; a desert scene, with rose cactus in the foreground and a butte in the background, with a minimum of exposure on a gray day, or immediately after a rain, while the haze still hangs, gives a wonderful rendering.

The Paget Method The Paget method may be a total failure if one does not learn how to make the *positive*. The special instructions issued by the Paget Company in 1914, which have not been issued broadcast, are reproduced here: "In making the negative, it is not of so much importance whether it is absolutely correctly exposed and developed,

as this can be rectified in making the slide; but in the case of the transparency, this must be of the very best if the final color result is to be perfect. If the worker will grasp the fact that to produce a brilliant result in any one color the other two colors in the viewing screen have to be completely stopped out, it will prove the necessity of having a brilliant transparency. If a negative be examined with a magnifying glass, it will be found to be full of squares, opaque, semi-opaque and clear, and in making the transparency, the opaque squares in the negative must be clear glass in the transparency, the semi-opaque become half-tone, and the clear ones should be so black in the transparency as to stop any light coming through and so block out the colored squares not required in the viewing screen. If the negative has been fully exposed and not too over-developed, so that even in the densest part of the picture gradation of squares can still be seen, it is always possible to make a good color result. First, take a perfect negative; the transparency from this should be exposed and developed as previously described. Second, should the negative be over-exposed and over-developed, that is, a flat negative without any contrast, the transparency should have the minimum exposure, so that a prolonged development can be given (quite 3 minutes) with a strong developer and after that, if the colors when bound up with the viewing screen be found not sufficiently brilliant, it can then be intensified with the standard chromium intensifier. If the negative is a contrasty one, exactly the reverse is done: the developer is weakened, the transparency is fully exposed so that the high lights develop up quickly, and development is stopped when the shadows have attained sufficient density. These two facts remain: If there is no color in the brightest parts of the picture, for instance light yellows, it is because the transparency has not been fully exposed; and if the colors are not generally brilliant, it is because the transparency has not been developed sufficiently, so that the little squares not required in the viewing screen are not sufficiently dense to do this work." Careful attention to these few points will ensure complete success.

**Tele-Stereo-
scopy**

Where there are no significant figures in the foreground and one desires stereoscopic effects of distant objects, it is possible to obtain such effects by *increasing the distance between the taking lenses* greater than the standard 65 millimeters. Thus one may have, as many stereo cameras provide, the camera objectives capable of being moved apart for a given distance. However, it is seldom that the desired separation is sufficient in this case and resort is made to movement of the camera bodily. Thus, if the object is a hill in the landscape a half-mile away, one may set his camera, make an exposure, then move the camera to the right or to the left, say, 10 feet, making the second exposure after orienting the camera to take in the exact view as before. The registering of the exact view is not a difficult matter if one rules guide lines upon his ground glass. The Verascope has a device whereby one may register quite exactly any distant object. The device fastens to the top of the camera behind the direct finder and has a pointer which gives the axis of view. This pointer remains at rest as the camera is turned, so that one may cover a complete 180° panorama without overlapping the several pictures. The orientation by means of the prism erector of the Stereo Graflex is a simple matter. Care should be exercised to have the horizon level in each case.

**Aëro-Stereo
Photography**

The great war has developed many new things for science and has shown the application of well-known methods to new uses. One of these is tele-stereoscopy for the aeroplane. By means of the "bullet-gun," taking a picture on film while the aeroplane is in motion and automatically changing the film for a new exposure, the observer is enabled to take back pictures of other planes, fortifications, etc., which are of great value. One picture is snapped as the plane is moving rapidly forward and another is taken with an interval varying with the distance of the object and the speed of the aeroplane. In this way, innovations in the enemy's plane and fortifications almost impossible to dissect from a plane, flat print, become intelligible. It is

possible to discover camouflaged works, the nest of machine guns from stereo photographs when the flat print fails to reveal the presence of such structures, for the relief, or the third dimension of space is taken care of. Inasmuch as there are seldom intruding objects in the foreground in aëro work, the tele-stereoscopic method probably will have greater application in the future, especially in surveys and map-making.

**Stereo Pro-
jection**

The question is very frequently asked, "Can stereograms be projected so that they may be used in a theater?" The answer is that no method for such projection has been worked to a successful conclusion as yet. There are at least two possibilities: (1) The principle of Wheatstone: One of the two pictures making the stereo-photographic couple is mounted upon the right-hand side of a pair of stereoscopic lenses and the other picture on the left. A pair of mirrors bring the images properly to the viewing lenses. Such a scheme might be composed upon a large scale for an audience, opera glasses being used in place of the stereo lenses. Even moving stereograms might be possible if one could synchronize the passage of the pictures on the two sides of the mirrors. (2) The principle of the *anaglyph* (from the Greek meaning "chiseling in relief"). The stereograms are colored, the one for the right eye red, the one for the left eye bluish-violet. The observer holds a stereoscope, the right lens of which is blue, the left one orange. By this means it has been possible to throw enlarged stereograms upon a screen, the observing audience holding the special glasses while viewing these pictures. Obviously such a matter is of more novelty than utility. Until a new advance is made, we shall not have stereograms presented to general audiences.

In drawing this all too brief story of stereoscopic photography to an end, grateful acknowledgment is made of assistance and information received from Mr. Withrow Morse, Dr. Nathan T. Beers and Mr. William Edward Ward. The field surveyed is one abounding in byways rich with interest. Many of these are dealt with in the books listed on the page following.

BOOKS

All the books here listed on stereoscopic photography are out of print, and must be sought for in public, technical, or institutional libraries, or at the stores of dealers in second-hand books.

The Stereoscope: Its History, Theory, and Construction. By Sir David Brewster. 235 pp.; diagrams. London, 1856.

The Stereoscopic Manual. By W. I. Chadwick. Manchester, 1891.

The Stereoscope and Stereoscopic Photography. From the French of F. Drouin. London, 1897.

The Elements of Stereoscopic Photography. By C. F. Rothwell. London, 1896.

Traité de Photographie Stéréoscopique. By A. L. Donnadieu. Paris, 1892.

La Photographie Stéréoscopique. By R. Colson. Paris, 1899.

The papers referring especially to the question of distance (separation) in the taking and viewing instruments are:

Anleitung zur Stereoskopie. By W. Scheffer, Berlin, 1904, and Dr. Scheffer's articles on this subject in Eder's *Jahrbuch für Photographie* for the years 1900, 1903, 1906, 1907, and 1908.

The Photo-Miniature Series, Nos. 5 and 98 are also devoted to the subject of this present monograph, but both numbers are out of print.

Notes and Comment

A few days ago I had the pleasure of a chat with Mr. J. Dudley Johnston, an English pictorialist and member of the Council of the Royal Photographic Society of Great Britain. Readers of *THE PHOTO-MINIATURE* will perhaps recall the reproductions of Mr. Johnston's delightful glimpses of the Italian lakes which have appeared in these pages in past years. Incidental to his visit to this country, Mr. Johnston has been in touch with pictorial workers here, in the endeavor to secure a closer coöperation between American and British photographers. It is especially desired that American pictorialists, amateur and professional, shall be more largely represented at the forthcoming exhibition of the Royal Photographic Society, which opens at the Society's gallery on October 13 next. The prospectus and application blanks for this exhibition are now ready and may be had on application to the secretary, Mr. J. McIntosh, 35 Russell Square, London, W. C. 1.

In order to meet the increasing demand for special research work and consultation service in the problems of direct color photography, Henrietta Hudson has decided to place her knowledge and skill in this specialty at the disposal of those interested in the many practical applications of this method. Her research laboratory at 501 Fifth Avenue, New York City is completely equipped for this service, and is at present engaged in important work for government departments and specialists who are extending the use of color photography in reproduction, scientific, and commercial work.

According to advices just received from the English publishers, a new volume of "Penrose's Process Workers'

Year Book" is being prepared and will be ready for delivery before the end of the year. Watch for later announcements.

PICTORIAL PHOTOGRAPHY IN AMERICA, 1920. The preparation of this volume, which is to be thoroughly representative of the best current work of American pictorialists, is being actively pushed, and it is expected that the book will be ready for delivery early in November. The volume will contain about one hundred full-page plates, reproduced in the best manner and carefully printed on art paper. The prints to be reproduced have already been selected by the editorial board from several hundred prints submitted by pictorial workers in all sections of the country. The text pages will offer an interesting review of the present position and progress of pictorial photography in America, and the activities of the various pictorial groups. In its makeup, engraving, and typography the book will be a worthy example of American graphic arts. Its publication has been undertaken as a contribution to the encouragement of pictorial photography in America, without any possibility of profit to those responsible for its appearance. As the edition will be limited and the advance order list is filling rapidly, those who desire copies should send their orders without delay. The price is \$2.50, and the selling agents, Tennant and Ward, 103 Park Avenue, New York City.

COLOR PHOTOGRAPHY. I have many enquiries for up-to-date information about new methods of making photographs in colors and books on this subject. There is at present only one book on the subject, "Photography in Colors," by George Lindsay Johnson, of which a new and revised edition was published in 1917; 302 pages, illustrated, price \$2.50. For information as to new methods and processes, those interested should see the monthly supplement on "Color Photography," published in *The British Journal of Photography*, London, weekly, \$3.50 per year.

CONVENTIONS. As this note is being written, the Photographers' Association of America is holding its annual convention at Cedar Point, Ohio. This is the national gathering of professional photographers and brings together about 2,000 workers in portraiture and commercial photography. Lectures and demonstrations dealing with professional problems are presented by prominent photographers, an abundance of entertainment is provided, and the manufacturers exhibit all their latest specialties. The exhibition of the work of the members is another big feature of the convention, which opened July 28 and closes August 2.

The twenty-first annual convention of the Photographers' Association of New England will meet at Springfield, Mass., September 8 to 11. This affair brings together the photographers of Connecticut, Massachusetts, New Hampshire, Vermont, and Maine, and promises to be of unusual interest this year.

PHOTOGRAPHY AND THE WIRELESS. According to the newspapers, the photographic recording of wireless messages is a matter of daily routine at the Ottercliffe receiving station near Bar Harbor, Maine. The instrument used is the invention of Mr. G. A. Hoxie, an engineer connected with the General Electric Company.

MOTION-PICTURE PORTRAITURE. Surely this is something new under the sun: A professional studio devoted to motion-picture portraiture, at the home of the patron or in the studio, as may be preferred. If there is another such establishment in the world, I have not heard of it. This studio, conducted by Messrs. Lifshy and Anderson, is at 537 Fifth Avenue, just below 45th Street, New York City, and comprises a suite of sunny rooms atop of the building, formerly occupied by Histed, a portraitist of international fame.

Mr. S. H. Lifshy, the principal in this novel adventure, has devoted himself to working out the possibilities of moving-picture portraiture for the past few years,

and is quite an expert in this special field. Those who would see for themselves what can be done in this direction are invited to visit the studio and ask for a demonstration on the screen. I enjoyed this experience a few weeks ago and have little doubt but that the new studio will turn out to be a great success.

STEREOSCOPY. A very complete catalogue of the stereoscopic cameras, stereoscopes, and accessories manufactured by Jules Richard, Paris, may be obtained for the asking from the American agent for this famous French house, R. J. Fitzsimons, 75 Fifth Avenue, New York City. The Richard specialties include the Verascope in many models, the Glyphoscope, and the Taxiphote.

An unusually comprehensive stock of stereoscopic cameras and accessories, more especially of the best European makes, is carried by A. Madeline, 503 Fifth Avenue, at the corner of 42d Street, New York City. To anyone interested in stereoscopy, a visit to Mr. Madeline's office will prove an encouragement and inspiration. Mr. Madeline also issues lists of his importations, which may be had on request. The booklet on the new stereo camera called the Ontoscope is especially worth seeing.

THE ARTOGRAPH SCREEN. A new use for the Arto-graph Screen, which was introduced to replace the expert negative retoucher, is suggested by Mr. W. B. Stage, a Fifth Avenue, New York, photographer. This covers the use of the Screen as a diffuser in enlarging, in which application Mr. Stage says that it gives him effects which in softness and diffusion are superior to those obtained by the use of bolting silk or chiffon. Arto-graph Screen Co., 501 Fifth Avenue, New York City.

ELEMENTARY PHOTOGRAPHIC CHEMISTRY. Under this title the Eastman Kodak Company, Rochester, N. Y., has issued, for free distribution, a very useful

little booklet, which will be welcomed by the serious workers in photography who desire to know something about the chemistry of photographic materials and methods. The book has been prepared by the staff of the Kodak Research Laboratory and covers its subject with commendable simplicity and brevity. Copies may be had on application to the Eastman Kodak Company.

THE PHOTOGRAPHY OF COLORED OBJECTS. A third edition of this popular handbook has just been issued by the Eastman Kodak Company. As the best and most practical explanation of orthochromatism and the use of color-sensitive plates and color filters in the English language, I commend it to the attention of all who have to face the many perplexing problems of this field.

CAMERA CLUB ACTIVITIES. There are many signs of a revival of photographic activities among the camera clubs of the country. The New York Camera Club announces a competition, open to the general public, for the best pictures of the Joan of Arc statue, which is located at 93d Street and Riverside Drive, New York City. Particulars of this competition can be obtained from the Secretary of the Camera Club, 121 West 68th Street, New York City.

The Newark (New Jersey) Camera Club publishes an interesting bulletin of Club news under the title, *The Ground Glass*, copies of which will be sent to any amateur residing in the vicinity of Newark on application. At this Club, every Monday night is an open night, when visitors are welcomed. The Club Rooms are at 878-880 Broad Street.

The Chicago Camera Club has been holding a series of exhibitions devoted to the work of one man or of small groups of workers, which have proved very popular. A special feature of these exhibitions, worthy of imitation generally, is the presentation to every visitor of a blank slip on which he is asked to record his choice of what appears to him to be the best picture on the walls,

together with his name and address. In this way a great deal of interest is awakened in the exhibits, the exhibitors are made acquainted with public opinion as to their work, and the visitor feels honored in that his opinion is sought.

The Southern Camera Club, Los Angeles, Calif., advises me that any member of a recognized camera club traveling in southern California may have the use of the Club's workrooms without charge for a period of thirty days by simply presenting his credentials to the Secretary of the Club. This privilege is one which will be of immense convenience to tourists in the Land of Sunshine, and offers an example of fraternal good-will which might well be followed by all camera clubs throughout the country.

The Toronto (Canada) Camera Club announces an International Photographic Exhibition, to be held in the Graphic Arts Building, Toronto, from August 25 to September 6. Visitors to the Canadian National Exhibition should not overlook this opportunity to see a worthy collection of Canadian, American, and Overseas photography.

GRAY'S PARALLAX REFLECTING CONDENSERS. I note that the validity of the patents covering the manufacture and sale of this specialty has at last been sustained in the Federal Courts, so that the inventor of this very practical and useful condenser will now begin to reap the reward of his labor in this field. The Gray Parallax Condenser is, without a doubt, the best article of its sort at present available for direct enlarging, copying, and machine printing. Get the circular from R. D. Gray, Ridgewood, N. J.

KODAPOD AND ONTIPOD. These are not two giants strayed out of an old fairy tale, as the reader might reasonably suppose, but the names of two useful little devices replacing the tripod, recently introduced by the Eastman Kodak Company. The Kodapod, which may be carried in the waistcoat pocket, offers full tripod

service in all outdoor work wherever a tree, fence or similar object is handy. Its jaws (it is really all jaws) grip and its teeth bite, with a grip and a bite which assure absolute rigidity in the support of the camera. The Ontipod is devised to clamp the camera securely to a chair, table, or automobile, and has a gentler disposition than the Kodapod as far as grip and bite are concerned. Attached to a tripod it offers the advantage of a ball and socket joint, which will permit the camera to be tilted and held at any desired angle.

The orthodox notion of running pictures *ad libitum* among the text articles of a magazine sometimes produces mirth-provoking combinations. Thus, in a photographic magazine just received, a charming portrait of an equally charming baby faces an article entitled "Photographing Domestic Animals." On another page we have an article entitled "Diagnosing the Negative" illustrated by pictures of a newly-born babe, and a "peach of a girl" beholding herself in a hand mirror.

PORTRAIT FILM. An interesting summary of the advantages of Portrait Film, as a substitute for glass plates, is published in the July number of *Studio Light* (Eastman Kodak Company, Rochester, N. Y.). This should be seen by every portrait and commercial photographer, to whom the Portrait and other flat-cut films offered by the Eastman Kodak Company should be an inestimable boon.

"BOOSTING" BY PHOTOGRAPHS. Mr. A. A. Richardson, of Bemidji, Minn., is rousing his state and the country generally with the idea that the best of all ways of "boosting" or advertising a town, section, or any form of industry is to photograph its features or activities and circulate the pictures as widely as possible. There can be no doubt of the correctness of the Richardson idea. I therefore reprint from *Abel's Photographic*

Weekly part of a paper on this idea, read by Mr. Richardson before the Northern Minnesota Development Association, which may help to spread the good work abroad. I quote:

"As loyal boosters of our state and region you are interested in the best ways to boost and promote us. Most of you know *some* boosting can be done by pictures.

"But how many of you appreciate how much has been done, is being done, and can be done by pictures? Having had years of experience in the photographic line, facts, ideas, and philosophies concerning pictures have come to me that might not come as fully to many others.

"Several years ago a series of some eighty pictures that I took on and near some large tracts of land within 15 to 30 miles of my home city of Bemidji, Minn., all 10 miles or more from a railroad, sold 2,700 acres at retail in about 30 days after the sets of photographs were put out, and wholesaled the balance of 8,300 acres soon after, so that the entire tract of 11,000 acres was sold out in about 60 days. The entire cost of a special auto trip with a party of four to secure the views, and to have the sets of post cards made was only about \$200, which figures out an advertising cost of 2 cents per acre.

"Some pictures—movies and stills—of Northern Wisconsin and Upper Michigan—their advantages and opportunities, were shown a western wool man at a Chicago convention. He was interested, and made a trip up into the territory. A man was sent west with pictures.

"The results have been that 25,000 sheep have already come into the territory from the west. Mr. Andrews, editor of *Cloverland* of Menominee, Mich., has just told you in his splendid, ringing address of how encouraged and enthusiastic they feel over the results already accomplished and in sight.

"Visual instruction is being used more and more for educational purposes; by the schools, the churches, various departments of our Government, etc. . . .

"*We* believe, because we *see*.

"Then let's show others, so that they, seeing, may believe, and act, and become boosters with us.

"Our problem being, then, to educate, my plea is to do it by pictures. . . .

"When one names to you anything as, table, potato, sheep, etc., your mind calls up a picture of that thing, and that picture is what conveys the idea to your mind.

"Does any one doubt this? Why, the entire history of human speech is of man's efforts to make sounds stand for things and ideas.

"*Naming* a thing calls up its picture in your mind, and the picture makes the impression that we call thought.

"But showing a picture of a thing makes the impression *direct*—the intermediate speech sound is saved—*one* step is taken to produce the impression, instead of *two*.

"Is it not then entirely clear that the picture is the more direct?—speech sound—mind picture—thought impression—two steps; photograph—thought impression—one step.

"Photographs also are generally recognized—quite justly—as being more true and dependable than speech. You may prove almost anything to a man by mere words.

"But 'a man convinced against his will is of the same opinion still.' The ordinary, or garden variety, of man is afraid of word proof because he knows it is often so untrue.

"And you know Abe Lincoln said, 'God must have loved the common people, because he made so many of us.'

"And the ordinary common man is certainly 'from Missouri,' and wants to be shown.

"Pictures *show* him.

"He *believes* pictures. And if the pictures and other facts prove strong enough, they will cause him to *act*.

"I know there is not one person here who does not thoroughly *believe* that facts show plenty of opportunity for any man right here among us in Northern Minnesota.

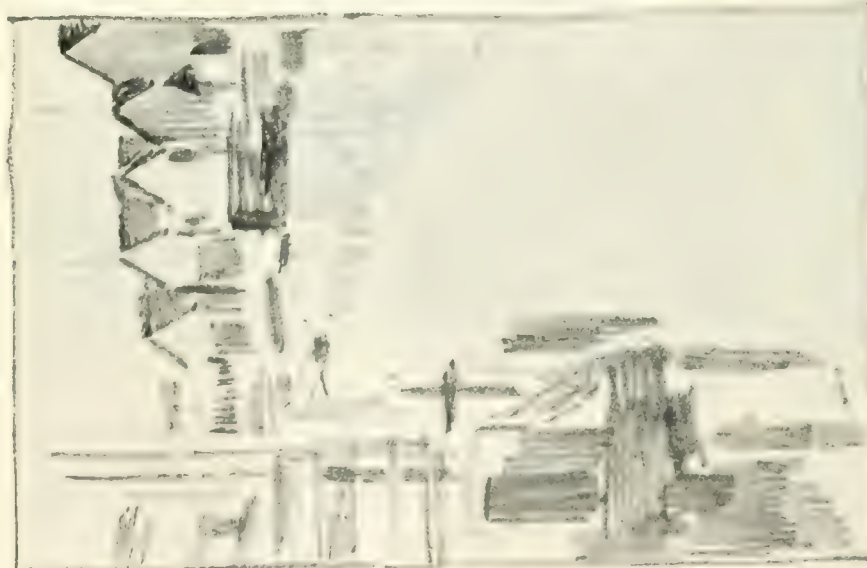
"Then let us demonstrate the facts to every possible person on every possible occasion by pictures."

I have just finished the reading of a delightful book, which deserves mention here as offering a wealth of

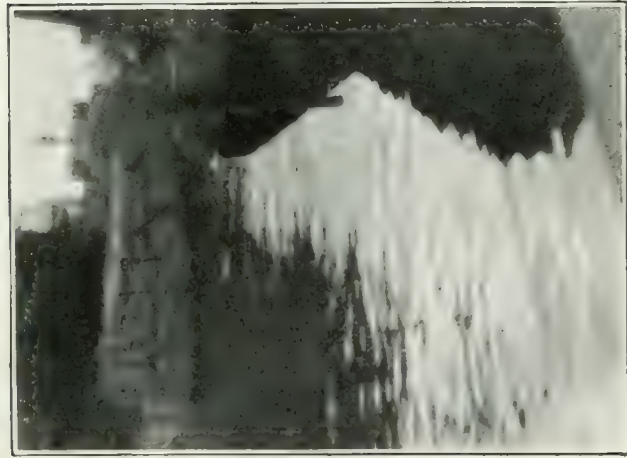
curious and helpful information to those who are trying to make pictures by photography, whether in portraiture or out of doors with nature. The book is entitled "Art Principles: With Special Reference to Painting," by Ernest Govett, and is just newly published. As its title indicates, the volume was not written with photography in view; but its pages abound with observations and views which the photographer can readily turn to practical advantage in his work with the camera. For example, take this concerning the smile in portraiture: "A pronounced smile in nature is always transitory, and hence should be avoided when possible in a painting. The only smile that does not tire is that which is so faint as to appear to be permanent in the expression, and it has been the aim of many painters to produce this smile." This, touching the illusions permissible in the arts, offers another good illustration: "The first and most important illusion in the art [of the painter] is that of relief, for without this no other illusion can be produced. It is a general condition applying to all work on a flat surface. . . . Its greatest value lies in its assistance to recognition . . . for the eye has to be considered before the mind, and it is of immense importance that the brain should have the least possible work to do in assisting the eye to interpret a work of art." But I forbear further quotations; the book itself is worthy of careful reading and study. It has 379 pages, with 31 plates; the lengthy Introduction and ample Notes adding very considerably to the practical value of the text proper. The book is priced at \$3.50, postage about 15 cents extra.



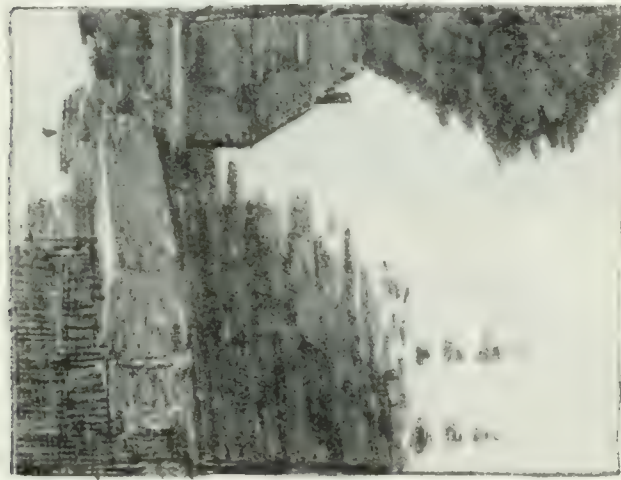
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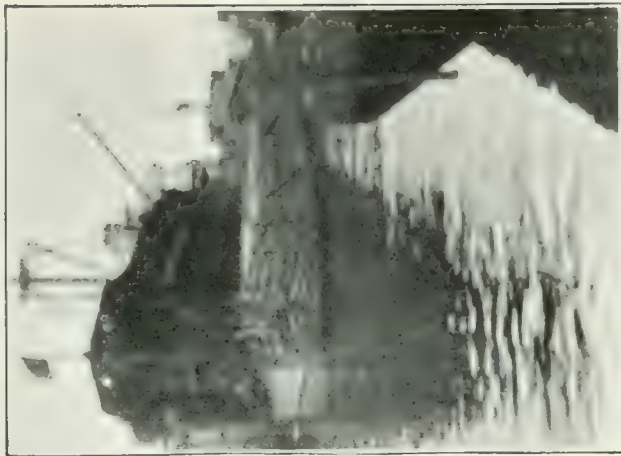
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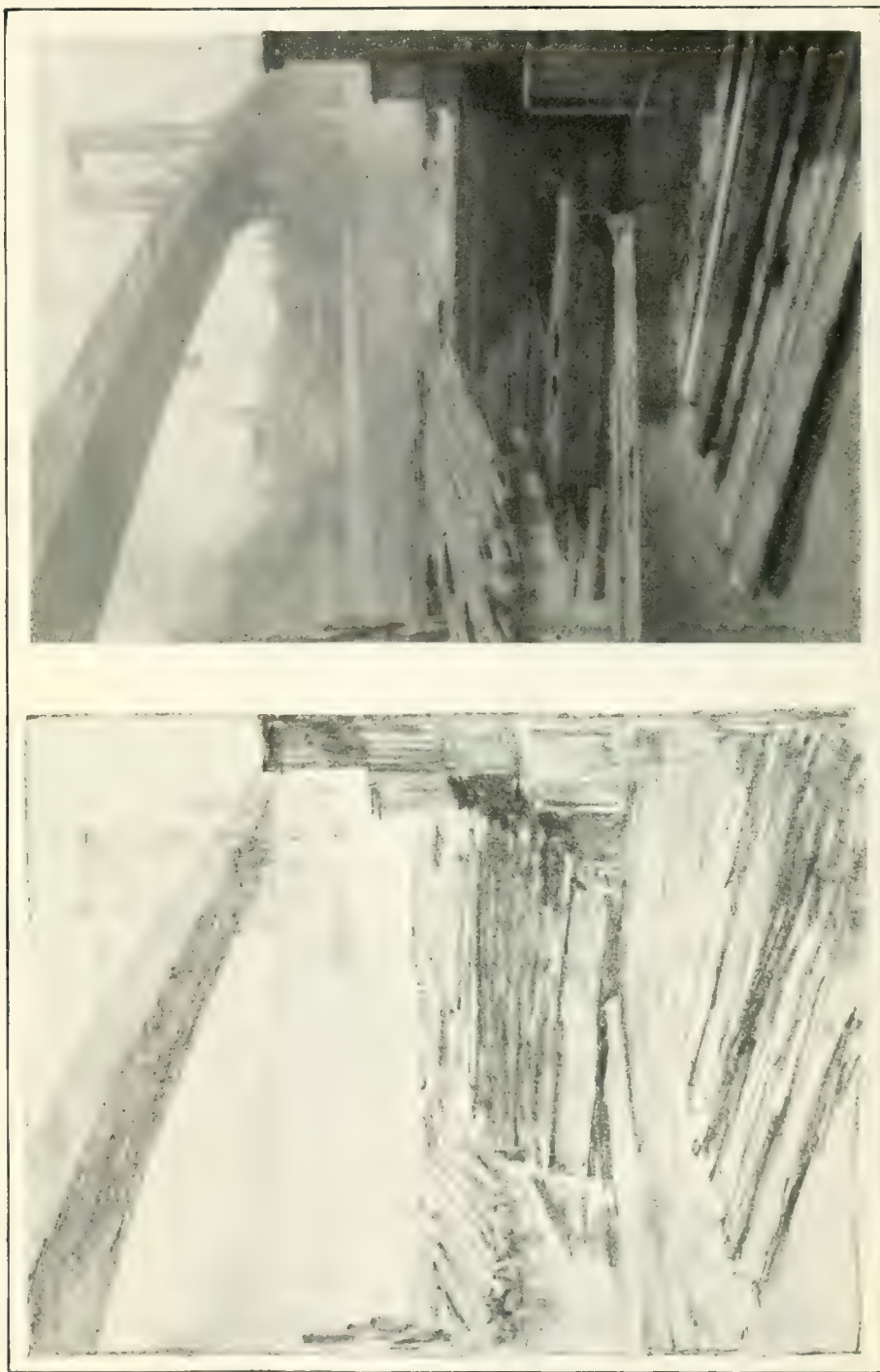
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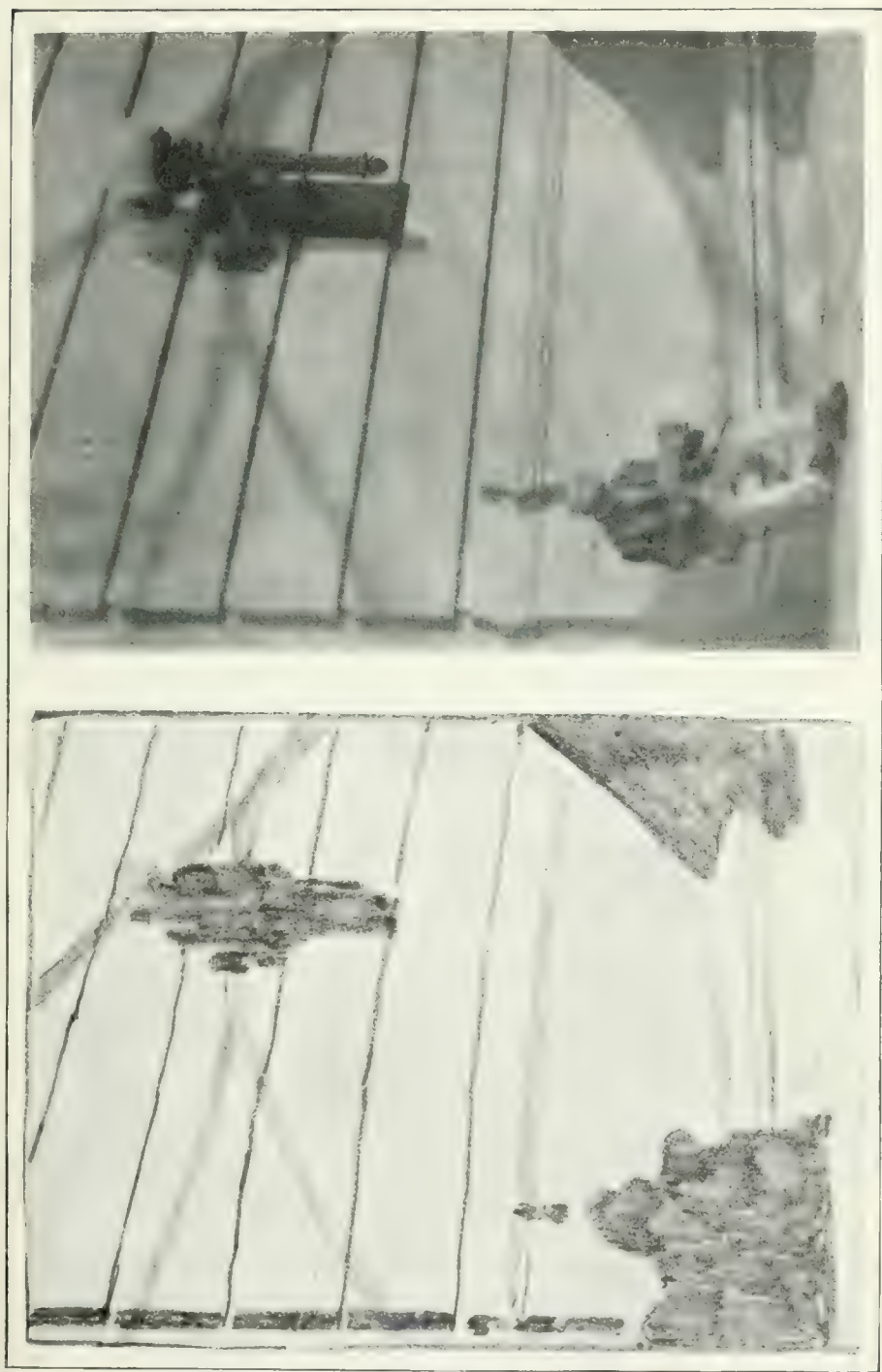
John Wallace Gillies



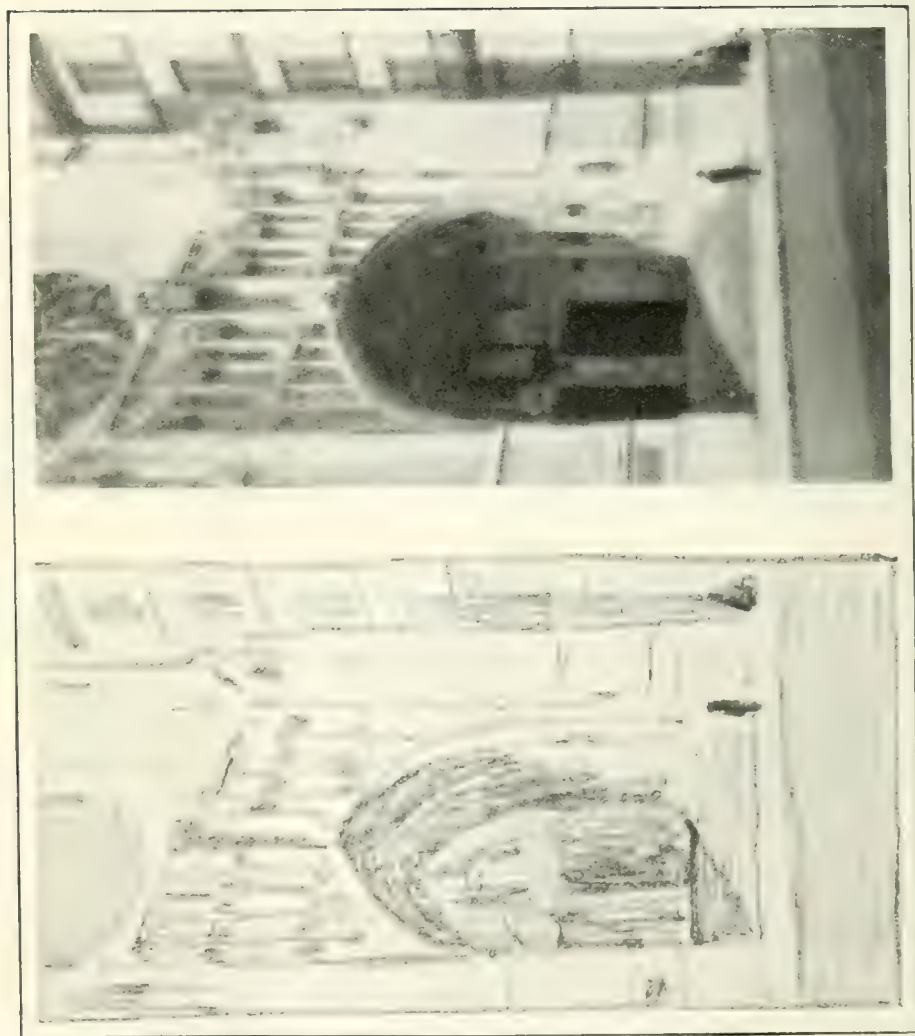
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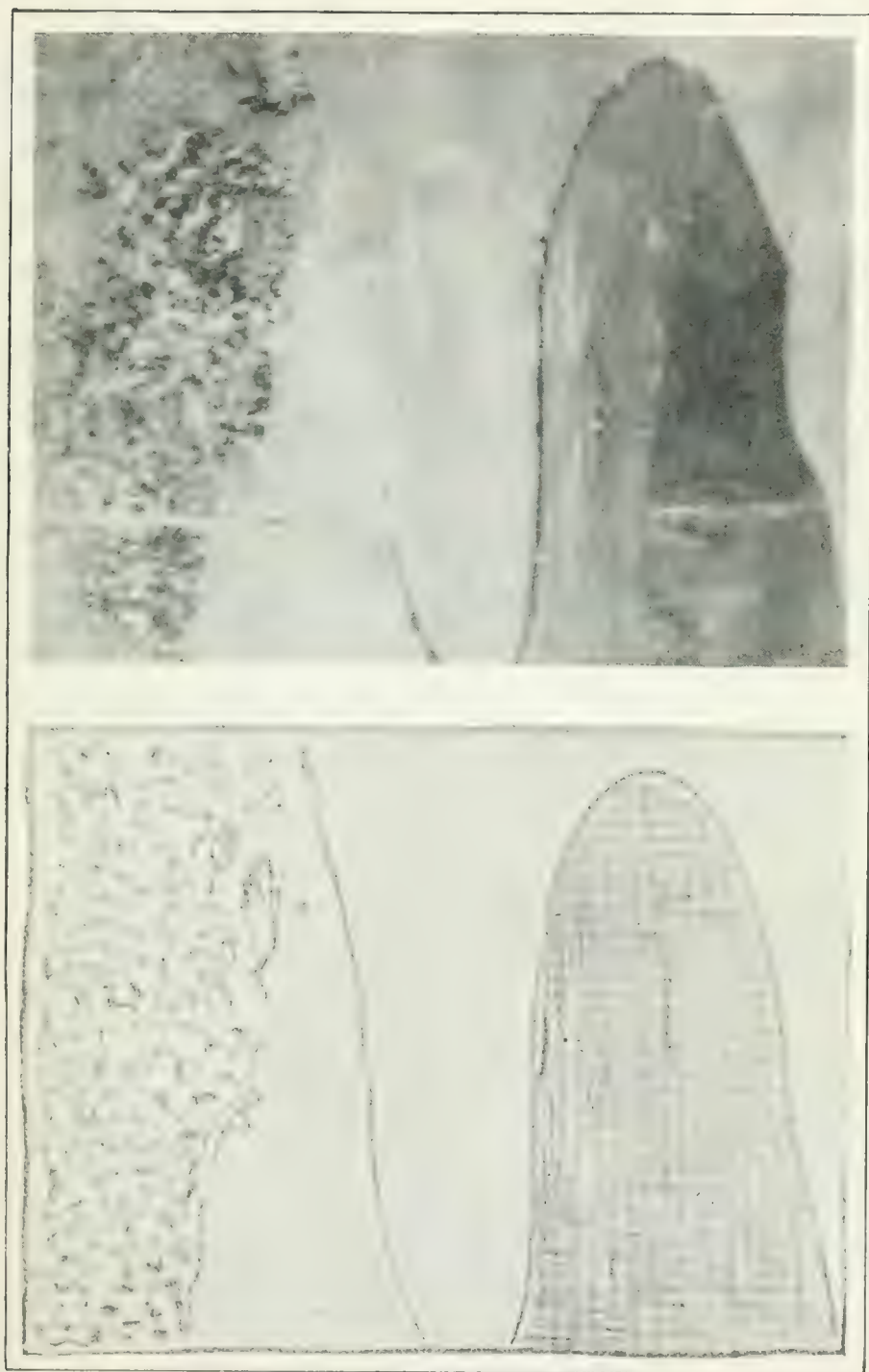
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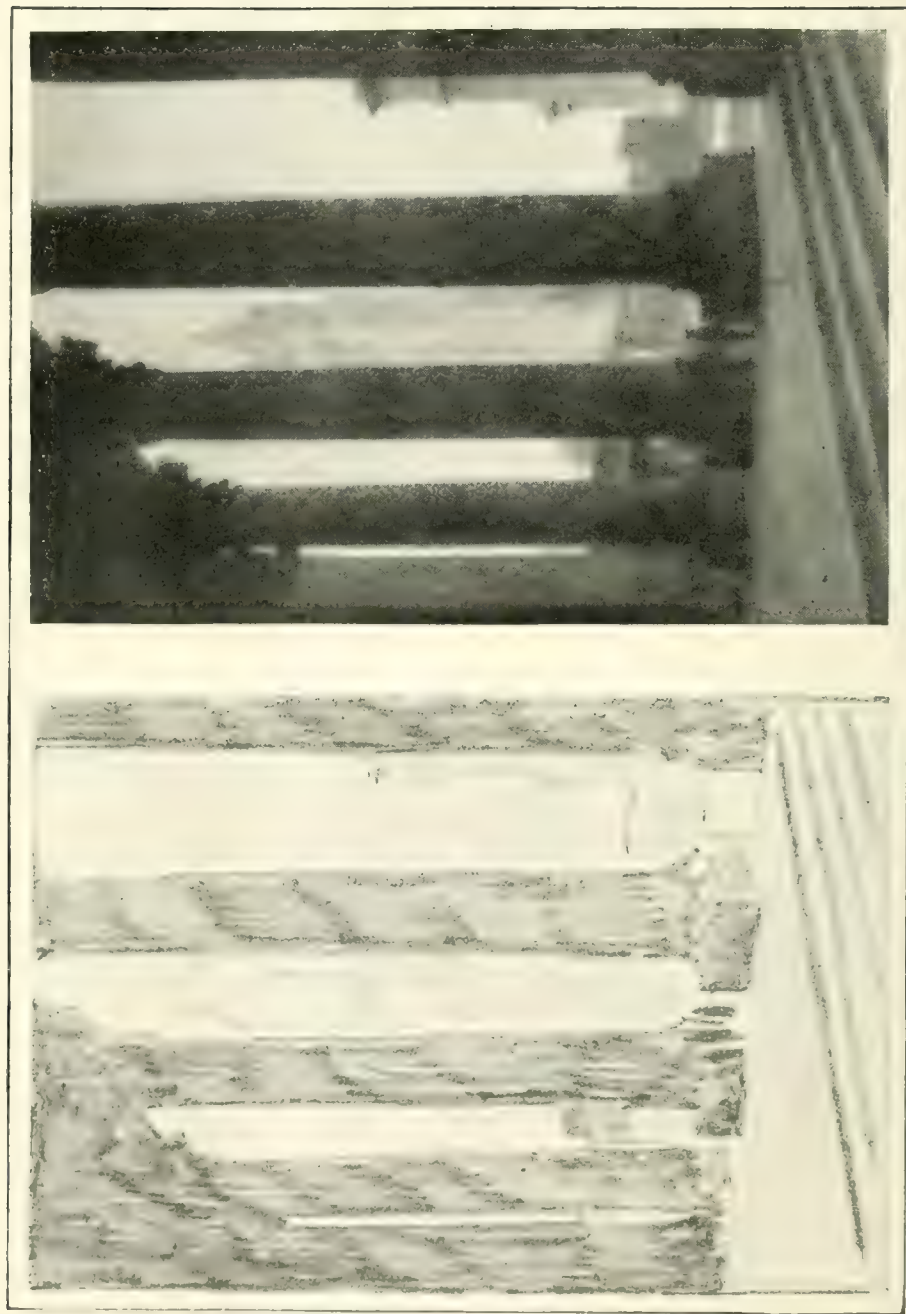
Print Number Four
John Wallace Gillies



Print Number Five
John Wallace Gillies



Print Number Six
John Wallace Gillies



Print Number Seven
John Wallace Gillies

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The Significance of Design in Picture Making

It was a dreary Sunday afternoon in early March, and I sat glancing idly through the pages of *The Sun*, hoping to find something to dispel the depression of the day and the misery of the scene outdoors. Suddenly my eye caught an editorial in the "Book World" section which gave me the idea underlying the present adventure. The writer of the editorial was expounding his theories concerning the writing of a novel. As an illustration he offered an analysis of Hergesheimer's "Java Head." Speaking of Hergesheimer's handling of his theme, he said: "This is æstheticism, pure and not so simple as it looks. It is Pattern. It is a musical phrase or theme presented as a certain flight of notes in the treble, repeated or echoed and inverted in the bass. It is a curve on one side of a staircase balanced by a curve on the other. It is a thing of symmetry and grace, and the expression, perfect in its way, of an idea." He then goes on to explain the necessity of pattern or design in any work of art, without which the work is meaningless, a mass of intricate detail resulting in confusion and bewilderment. After warning the reader against the abuse of pattern, as an evil comparable only to the utter lack of it, he says: "The trouble is seldom primarily, as so many people think, with the material but with its presentation. You may take almost any material you like and so present it as to

make it mean something; and you may also take almost any material you like and so present it as to make it mean nothing to anybody. A heap of bricks is meaningless; but the same bricks are intelligible expressed as a building of whatever sort, or merely as a sidewalk with zigzags, perhaps, of a vari-color.

"The point we would make—and we might as well try to drive it home without further ineffectual attempts at illustration—is that you must do some patterning with your material, whether bricks for a building or lives for a story; but if you pattern too preciously your building will be contemptible and your story without a soul. In your building you must not be so decided as to leave no play for another's imagination, contemplating the structure. In your narrative you must not be so dogmatic about two and two adding to four as to leave no room for a wild speculation that perhaps they came to five. For it is not the certainty that two and two have always made four but the possibility that some day they may make five that makes life worth living—and guessing about on the printed page."

This is well said, and it applies as closely to the making of pictures as to the writing of novels.

**The Universal
Urge**

The desire to make pictures with the camera, instead of mere photographs, has persisted since photography began. Many books have been written for the encouragement and direction of this desire, most of them purporting, in brief, to tell the reader just how, by rule and measure, he might make pictures in place of photographs. But the making of pictures is one of those things which cannot be taught in books, nor accomplished by the following, however carefully, of rules and measures. So that generations of camera workers have come and gone, leaving but scanty treasure of pictures made with the camera, despite all the books. The pictorial urge, however, is born anew in each succeeding generation, is stronger today than ever before, and more urgent in its search for suggestion and guidance. The liveliest and most worthy movement in photography is the pictorial movement. There, and not in the commercial or professional uses of photography as some

imagine, we find the noblest sort of striving, and the most patient, painstaking effort.

**A Key to
the Problem**

There is no royal road to the making of pictures in photography. As I have said, you cannot express the method in any formula or set of rules. But it may well be that a fresh view of the subject, or a modern analysis of the problem, will set a worker here and there upon the right way, and so help him to the satisfying of his desire. Such an analysis is here offered by one who has given much thinking to the significance of pattern or design in picture making, as well as time and labor to the application of the idea. Whatever may be the net result, with the reader, of the thought and work embodied in these pages by John Wallace Gillies, the scheme presented has helped him to produce pictorial photographs of unusual interest and acknowledged merit. I am confident that it will be equally helpful to the reader who will give it the consideration it deserves.—EDITOR.

**Three
Essentials**

There are three things which enter into the making of a picture, whether by photography or any other process. They are design or composition, technique, and that elusive, hardly to be described something which we call "feeling," which gives to a picture its greatest attraction and appeal.

**The Necessity
of Design**

Everything has to be designed, whether it is a rug, a painting, a building, a business scheme, or a picture made with the camera; and the success of the work depends, in part at least, upon the design. By design, it may be taken that we intend to say, to work out or plan.

Everything has to be worked out, and the success of the process depends entirely upon the amount of thought and study we give to it. One may think whatever he pleases about anything at all, and from it derive a result. Of course, I am speaking of constructive thinking. There was the man who saw the city throw away its rubbish for years, until he conceived the idea

of salvaging lost articles from it and worked out a plan. Today that man pays the city \$80,000 a year for the rubbish it formerly threw away, and he derives a handsome income from the business.

So we reach the conclusion that all our works depend for their success upon the thought we put into them or into their making, regardless of whether or not we are gifted with or have acquired that good craftsmanship, called in photography and kindred arts, technique.

On the other hand, the naturally good technician can manufacture—and manufacture is quite the right word to use—fine prints for us to look at and admire. But, unless he adds the quality of design to his work, the picture is not there. His finely finished prints may momentarily trap us into admiring them as pictures, but the delusion will quickly pass. Mere technique, of itself, is not sufficient; it gives the faultless record and stops there; its interest is purely technical. Design expresses an idea rather than mere form; adds decorative interest or pictorial effect, and may introduce the element of beauty *per se*, as apart from these. One would rather receive a message, written with a lump of charcoal on wrapping paper, than an exquisitely penned epistle on the finest notepaper which said nothing. You cannot read fine notepaper and penmanship. There must be expression of some sort.

We come, then, to the part which thought plays in our picture making, and you must, please, agree with me that it is the major or better part; so that technique, and the making of fine negatives and prints, may be regarded as the minor or lesser part in the making of the picture. For surely he who puts his whole heart and soul into thinking out his pictures, expressing his idea by design, will have the desire to base his compositions upon sound technique; and so, since desire leads to accomplishment, it is as good as done, and we need not further consider it. Besides, is it not fairly agreed that a poor print of a good picture is more to be considered than a good print of no picture at all? It must not be inferred from this, however, that good technique

is to be sneered at, for it is, in fact, one of the requisites of a truly great picture, design or composition being another essential element.

**With an
Explanation**

This evaluation of the relative importance of technique and design is a dangerous matter for any man to adventure, and few have done it with any effect, since it seems to imply that the writer speaks as one having authority, himself a maker of good pictures. I express my opinion, however, since it seems necessary, without any claim to authority, confessing that I have made few, if any, pictures which have left me contented. If, moreover, out of the admitted weakness of an expression of opinion arising from the irritation inherent in the subject, even one man may gain a fresh or new viewpoint, and thereby make better pictures, the adventure is justified.

**Feeling:
Soul**

The third requisite in picture making is that intangible, nameless, and utterly indescribable quality which, for want of a better word, we may term feeling, spirit or soul, which gives a picture its chief charm. We get a glimpse of its meaning or significance when, in music, we say that a pianist lacks technique or knowledge of musical structure, but plays with richness of feeling. It is the spiritual reaction between the artist and his theme; the spirit which quickens the letter or form. This quality is the greatest, as it is the most vital and desirable, of the three; but since it is either part of a man or not, as the chance lies, and something which discussion cannot change, it is set aside with this brief mention, as a thing quite necessary, but not to be added to or detracted from by words of mine.

**Design as
the Key**

The appreciation of design is suggested as the shortest road to good pictures; a master key, as it were, in the gentle art of making pictures rather than photographs, and so may well bear discussion. Feeling, spirit, or soul is there, or is not, as the man has it, or has not; and it is for each one within himself to seek out and put that quality into his work. Design and technique are but the spokesmen of this spirit in picture

making and comprise the method of expression. Spirit or feeling, with no design or skill in technique, gives us but poor expression of itself. Without feeling, design and technique are as nothing. Even a rug has to have feeling or spirit behind its design, and craftsmanship of weaving, to make it fine.

Technique may be acquired by practice, and an appreciation of design is bettered or improved by study. Some may be gifted with a natural sense of design and proportion, and others may be lacking in it, but few are wholly devoid of it, and, certainly, all of us can cultivate its appreciation.

**A Note
on Art**

John Powell has defined art as "the expression of an emotional experience," and added further that when the mind is in the subjective state, or still under the rigor of that emotional experience, one is not in condition to express himself clearly regarding it, but with the aid of time and its added clearing of perspective, must look back upon the experience, consider it objectively and then create his work. While this may be true, it is obviously not so in painting, and even less so in photography, or, rather, in the making of pictures by means of photography which, for the sake of the argument, we will here consider as an art.

**Applied in
Photography**

One cannot question the fact that the pictorial worker, turning his camera upon a composition, has often experienced a very distinct feeling of pleasure in the picture presented within the four edges of the ground glass. And often enough it was necessary to work quickly in order to secure an impression of the picture under consideration, before its charm or illusion vanished under changing conditions of illumination or atmosphere. The worker in photography, then, is faced with the problem of keeping a clear head and a slight grasp of his objective mind, even while in the subjective mental condition. Many times he does not succeed in this, and the picture is lost. But at other times the worker is more at rest amid conditions which permit him to set his camera at leisure, or even take his own time in the arrangement of the subject, as in still life and some-

times in portraiture. Most of us, however, have experienced very tense moments in portraiture, in the attempt to catch the fleeting expression of a difficult sitter, with an exposure of a second or two which, at the time, seemed a year at least.

**Meeting
a Difficulty**

The design of the picture must, in these conditions, be accomplished—that is to say, conceived and worked out—amid manifestly adverse circumstances, with an instrument or process which permits little or no elimination and often no changes in the subject at will. In such a case the only opportunity for design or composition may lie in selection, which is often a rigorously limited means of elimination. It is for such a reason that the camera worker should cultivate his sense of design to the utmost, as it is the only part of his picture making which he is called upon to use consciously at the moment of making the picture. The feeling or spirit of the picture comes of its own accord, and is almost automatic in its functioning. Technique is not called upon until later on in the process. Thus, the sense of design is the only faculty which receives severe and sudden stress, and which, indeed, gives way under the strain and becomes unmanageable, so that confusion results. It is this which we observe in those pictures which strike us as “not quite happy.” If, on the other hand, the sense of design is trained and cultivated until it is almost intuitive, coming into play unconsciously, then the placing and spacing of the picture on the ground glass is a matter of unconscious effort. This cultivation may take time, perhaps years of progressive exercise, but, to my mind, it is a simple and easily followed road to the making of good pictures.

**Nothing
Inconsistent**

So much being said from the viewpoint that design, rather than technique, is chiefly to be considered in any attempt to achieve pictorial quality in the photograph, it may seem inconsistent, in the face of such an argument, to discuss methods of cultivating the sense of design, since this may be classed as technique! There is, however, no inconsistency. The camera worker knows full well that the camera is the

greatest of draughtsmen, capable of any angle of perspective, any quality of drawing, and infinitely varied contrasts in the presentation of the subject. He knows, too, that these capacities should be so mastered that they may be controlled and compelled to serve as aids, rather than hindrances, in building up the design by which the picture-maker adds the decorative interest to his work. You may, perhaps, "take pictures" by technical methods, but you can only "make pictures" by design, i. e., by ordered arrangement.

**The Meaning
of Design**

By design here we mean pattern, which is any sequence or arrangement of lines, spots or masses within a space, worked out and intended to express an idea or to represent our impression of something. The design may be characterized in any way we choose, and may be pleasing or displeasing; but if there is any actual or suggested arrangement of spots or lines, it is a pattern.

**Two Kinds
of Design**

There are two kinds of design—literal and suggested. The first is plainly indicated in some form easily recognized, even by the eye untrained in the perception of pattern; the second is suggested in its form by an appeal to the mind rather than to the eye alone.

**The First
Picture
Making**

Primitive man first scratched his pictures of animals into the face of a rock, using a piece of harder rock as his tool. His thought was simply to indicate the animal well enough, so that his fellows could recognize the kind of animal he had in mind. Later he began to pay attention to the order and placing of his markings, so that the representation would be more pleasing or more interesting as expressing his idea of the subject. This was a deliberate attempt to pattern and so achieve a more harmonious whole, adding to the mere representation of the subject some other definite interest, e. g., a decorative quality.

The Intention

The first pictorial impulse in all of us is to reproduce faithfully, which the camera does excellently well, and then to reproduce interestingly or beautifully. It is here that we come to the part played by design in our picture

making, in that by the introduction of this element of pattern or design, we can indicate our own impression of the subject, or present some aspect of it in which we perceive beauty or interest outside of and quite beyond mere external form.

**Design, Not
Interpretation**

To call this interpretation, as some do, is to misuse the term, for it is by means of design or pattern that we express our interpretation, the one being the means and the other the end. There is a fundamental order and symmetry in everything, and it is by thinking out and working out or patterning what we discern or understand in our subjects that we reveal their beauty or decorative interest. In this appreciation of design and its use the pictorial worker reaches the summit of his desire, and enters upon the way of picture making in photography.

**Thinking
and Working
in Order**

So, in attempting our own interpretation of any subject, or the presentation of our impression of it, which always supposes something more than a mere record, there must be a definite effort to place or arrange the lines, spots, masses, lights, and shades in some orderly array which we here call pattern or design. And, naturally, before we can hope for success in this putting together or arrangement to form an harmonious whole, there must first be an appreciation of the significance of the lines, spots and masses, presenting the external form of the subject as we see it.

Motive

Let me here digress for a moment to express the opinion that the prime object in all our picture making is to interest or give pleasure to others, to express oneself or one's interpretation or impression of something for others, and not, as some have argued, for one's own pleasure. This latter is a lesser and secondary impulse. Which is not to say that we do not do things for our own pleasure, or seek to express ourselves simply for the interest or joy of expression; but that, chiefly, our work is for others and proceeds, generally, from an unselfish motive. "A gentleman," says George Bernard Shaw, "is one who gives more to life than he gets out of it."

Picture making, then, implies the **Arrangement** patterning or thinking out and working out of the subject in some obvious or suggested, ordered array; the putting together of elements to form an harmonious whole. Let us continue our consideration of the methods we may use in applying this principle in picture making by photography.

In making the pictorial photograph we are not attempting literally to record or delineate a subject for any special purpose, but rather to weave our impression of the subject into a design, bounded by the four edges of the picture space, which we are pleased to call a picture. This weaving is essentially a structural process, the building up into a pleasing harmony of the few or many elements in the subject.

The pattern, or design, may consist of lines, curves, spots, and masses; lights and shades may be interwoven in any or all of these divisions. The handling of other and more subtle elements, such as the illusion of relief or depth and certain more abstract things, we will leave out of consideration for the present. The design may be very literal, so literal or geometrical, in fact, that the picture quality may be abandoned and the subject matter of the picture be cast aside, in favor of presenting an arrangement of lines or spots which will be pleasing from the viewpoint of pure design. But this may be termed a very Teutonic, or inhuman, method of achieving decorative or pictorial quality. I hasten, therefore, to correct any impression that I intend an abandonment of the other essentials of picture making, merely proposing here an intensive consideration of the principle of design, to the exclusion of other ideas, in order that we may the sooner arrive at a right understanding of its significance and employ it in our picture making.

The most profitable of the many books dealing with this principle of design and its significance is Arthur Wesley Dow's monograph on "Composition." He does not speak of its application in photography (a thing which excites my wonder whenever I read his pages),

but deals with it in connection with rug-making, tapestries, painting, and other crafts wherein the principle of design plays an important part.

**Whistler's
Paintings**

The paintings of James McNeill Whistler also seem to me to offer fine examples of the decorative use of design, upon which one might profitably base his idea of its use in pictorial photography. Whistler worked almost in monochrome, using but slight variations in color, but rather gradations in density, to accomplish his tones, and many of his works might be mistaken for photographs at a little distance. The Japanese and Chinese painters also offer good examples of this sense of design, although some Japanese prints are too involved in design structure to be taken as examples for photographic composition. In this latter, simplicity is a master virtue, for the reason that the camera is inclined to give us altogether too much of the subject, the pattern being too intricate and involved, so that clarity is lost and the pictorial interest is confused.

**Architecture
and Design**

Perhaps the most convincing example of the virtue of simplicity of design that I can think of is found in architecture. Here the early forms of either classic or Gothic architecture were simple, clear, and chaste—and very beautiful. As the periods became older, the designers became more flamboyant in expression, and the beauty of simplicity was lost in over-decoration. So it is in pictorial photography, now in its infancy. The simpler the design or pattern, the more surely will the work be virile and beautiful. In all fine art or perfect expression you will find the greatest possible economy of means.

**The Abuse
of Design**

Anticipating the comment that design may be carried to a point where it becomes mechanical, so that the picture is emotionless in its geometrical aspect, I may mention that it is possible to portray almost any emotion by the character of the design. Humor, pathos, happiness, sadness—all emotions may be indicated in an abstract way by the quality of the design. Or shall I borrow a better word from music, and say rhythm? In music rhythm plays a very important part in ratio to its

effect, adding or detracting greatly, quite irrespective of the notes—and rhythm is just as possible, and as potent, in picture making as in music.

**Limitation
in Use**

It is conceded, however, that in photography we are limited in our use of design more than in other arts, since in them we may move lines or spots, or eliminate or subordinate them at will. In photography this power of subordination or elimination can be accomplished only by selection of viewpoint, and the rise and fall or swinging of the lens. Subordination sometimes may be controlled in illumination or in the making of the print. But these are minor handicaps in the long run, and are more than recompensed by the wonderful facility of the photographic process.

**Helpful
Diagrams**

The graphic exposition of the salient features of design, as applicable in photography, has been so cleverly done by Professor Dow, in the monograph on "Composition" already mentioned, that I refrain from any attempt at diagrams here, and refer the reader to Professor Dow's book as a source of continual help and inspiration. The following diagrams in that work will be found especially useful: (1) Page 25—Third design from top of page in right-hand column. (2) Page 46—Upper left-hand corner design; blacken in the gate seen in foreground. (3) Page 46—Lower right corner sketch; blacken in the bridge and dock. (4) Page 48—All three sketches, as examples of spacing. (5) Sketch in lower right corner. In all these examples the important part design plays in the effect of the picture is very clearly shown, and in (4) we see that, with the same subject and viewpoint, the shape of the picture space has a marked effect upon the composition.

**Spacing
and Design**

In photography, of course, we are free to use any shape we desire from a square to a panel, either in composition of the subject or by trimming the print. The circular and oval shapes are not mentioned, as their use is abnormal. We have also the ability to place the subject matter higher or lower in the picture space, by racking the lens or even by tilting the camera, though this latter

is a bad practice and not to be commended. The effect can also be varied by mounting the lens off center on the lens board, by racking the lens up and down, and by a careful selection of the viewpoint.

A Method of Determining Design The relation of the lines and spots to each other and to the boundaries of the picture space determines the beauty or interest of the design, and upon this in turn depends the effect of the picture. If you will take the trouble to trace, on tissue paper, the prominent lines and masses of any picture you like, you will get the structural design, which should give you as much pleasure as the picture. This is a very profitable exercise in the cultivation of a sense of design and I have reproduced herein several examples, which show the method suggested for making these tracings.

By following this suggestion, you can obtain a set of designs which appeal to you, and if you have not previously thought of pictures in terms of design, this may be a good way of determining your taste in design, which when developed to a point where you have become acquainted with it, will begin to insist upon being represented in your pictures.

On What Design Depends The design, as you become acquainted with it in this manner, will be seen to depend on many things: perspective, angle of lens, subject matter, tones, cohesion of parts, simplicity of form, shape of picture space, and whether the shape is vertical or horizontal as to position. Let us consider these briefly.

Other Factors The perspective is sharper as the angle of the lens is greater. A lens of narrow angle, such as a lens of 9 or 10 inches focal length on a 4 x 5 plate, will, under ordinary circumstances, produce designs of greater simplicity than those given by a lens of shorter focal length and therefore greater angle of view. The wide-angle lens, on the other hand, gives sharper perspectives and greater depth in the picture, with a more dramatic effect. Distortion in form should, of course, be avoided, but this rarely appears when a wide-angle lens is used in a vertical composition with a narrow base.

Subject Matter The subject matter is the chief factor in determining the pattern, but by means of the many other points over which you have control, you can do many different things with the same subject. For example compare Prints 2 and 2A among the illustrations.

Tones Tone, strange as it may seem, has a very definite effect upon pattern. Simplicity and cohesion may well depend upon the tones. With contrast, for example, pattern may become more insistent. I may amend this by saying that local contrast intensifies pattern and general contrast diminishes it. By this I mean that a fully exposed negative is usually not too strong in contrasts, and the extremes of tone are so well held together that the design is thereby accentuated. In an under-exposed negative the extremes of tone are so forced that the design is lost. Everything is lost, for that matter, which is good in the picture. Under-exposure is abominable. The fully exposed plate may be developed, by the use of plenty of bromide, into a snappy negative, which while holding its general tones beautifully, will yield plenty of local contrast in the print, and this type of negative accentuates the design.

Unity Cohesion, or unity of parts, may depend upon tone and is regulated chiefly by the use of technique. Thus, a soft negative, wherein the tones are well held together, will yield a print with beautifully graded tone values, and this will give cohesion in the design with added effectiveness in the picture.

Simplicity Simplicity in a picture depends largely on the values. These, in turn, will depend upon the selection of the subject or the viewpoint from which the subject is presented, as well as upon the control of the tone values. Simplicity is a quality greatly to be desired, so much so that we may speak of it as the keynote in successful picture making. Thus, one may select a viewpoint which will show a wide variation in tone contrast, with perhaps a broad band of highlight and an equally broad band of shadow, but without minute variations of light and

shade to irritate, and the result will be pleasing by reason of the simplicity of the design. Of course, one can carry simplicity to extremes, and rob the design of all vital interest.

**Design Alone
Insufficient**

The design will largely determine the shape of the picture, and as we can generally control this it should be of great use in aiding the composition. One man may insist upon pattern to the exclusion of pictorial interest. I have seen this phase of the use of design in photography in the illustration of magazines. It had a certain interest as an experiment in design, but was otherwise uninteresting. You cannot make a picture by a purely abstract consideration of design; but it will help you in picture making if properly used as a means to an end.

**Avoid
Crudity**

The design should not be too obviously geometrical or literal in character. At first it will be that way, and your pictures will be studies in line and mass, such as are appropriately used for the illustration of a child's primer. This, of course, is simply crudity of expression, inevitable in the beginning. But gradually you will assimilate the idea or principle of design or pattern; so gradually sometimes that you will hardly discern your progress, while at other times you will advance by bounds—as every student has experienced. In the end you will acquire that innate sense of pattern which will show in your pictures, without shrieking “Here I am, Design,” as it did in your first attempts. So, where at first you were obsessed with the idea of pattern and therefore expressed it crudely in your work to the detriment of other qualities, in the end it will be employed unconsciously, entering into your work with a soft step, and not insisting upon the center of the stage.

**Cultivating
the Sense
of Design**

The sense of design may be so cultivated and can become so acute that the location or placing of the salient features of any given subject will become a matter of fractions of an inch. This may seem to be an extreme view, but it is drawn from my own experience, and is the basis of my contention that the pictorial photographer should make his pictures afield,

i. e., on the ground glass in the face of his subject, instead of the method so frequently practised of making negatives afield, and selecting, extracting, trimming or enlarging pictures from his negatives at home.

**A Personal
Experience**

Let me relate an experience. I was called upon to make some photographs of a country estate, and, while on the spot, was asked to make the best possible picture of the home, considered from the pictorial rather than the technical viewpoint. This latter task I accomplished to the complete satisfaction of my client, who ordered many prints from this particular negative. A year or two later I found myself again photographing on the same estate, and it occurred to me to secure another plate of the house from the pictorial point of view, and to try to better the picture made on my previous visit. I did my best. Upon developing this plate and comparing it with the earlier negative, I was surprised to find that there was no change in perspective or position in the two pictures which made a difference of more than a sixteenth of an inch on the 5 x 7 plate.

**All Have
the Design
Sense**

This struck me as a curious thing and set me thinking. Always of the opinion that design is the vital factor in making a picture in monochrome, since color composition is not available in photography, and that each person has his own sense of design or pattern, it was driven home to me that the sameness of the two negatives was not a matter of chance, but the working out of a natural law. Since that observation I have frequently noticed the working out of this law, so that I am convinced that every man has his own sense of design, which does not change, but is undoubtedly developed by cultivation.

**All Can Make
Pictures**

If, then, we all have this sense of design, or an appreciation of the fundamental order and symmetry which is in all things, it follows that we all can make pictures with the camera, since with this means the tedious technique of drawing need not be acquired, and we need but to educate and cultivate our sense of design and apply it in our picture making.

In this cultivation of design sense, **Individuality** the predilection of the individual will, of course, find natural expression. Some have a predilection for soft and flowing curves, others for strong lines and masses. In the end, as each man expresses himself, our pictures will inevitably be cleverly balanced documents of each man's fancy and development in this principle of pattern. This will make for individuality or, if you will, originality, which is a quality much to be desired in picture making in photography, wherein, at present, we have too much slavish and futile imitation of certain leaders and their mannerisms. You will find this at any exhibition.

If the beginner will only avoid this **Avoid Imitation** servile imitation of the so-called leaders, and the blind copying of their mannerisms and effects, he will thereby set his feet upon a surer and better way of making pictures. Each man must travel his own trail in this matter of picture making, and borrow from no one save himself in his expression of his subjects. Let me therefore persuade you to cultivate for yourself an appreciation of those qualities which enter into the picture, and especially of the sense of design or pattern herein discussed, as the surest ground work for originality and success in your picture making. Let your striving be always to express your own interpretation of your subject.

Express Yourself Just as surely as every tub must stand on its own bottom, so every picture should stand on its own merits, as an expression of the maker's interpretation of the subject, and not as an imitation of some other worker's interpretation of a similar theme. When your pictures are shown at an exhibition, they should explain themselves, deliver their own messages, speak your purpose without ambiguity. If they cause anyone to pause and ask: "Now what the deuce was he getting at?" or to say: "Ah, there is an imitation of the effects so successfully obtained by So-and-So," there can be little credit to you. But if your work expresses yourself, and it is animated by the sense of pattern and truth of feeling, depend upon it you will receive your reward.

The Decorative Interest

The real and permanent interest in the pictorial photograph, and the best reason for its existence, is the decorative interest. I say this as supplementary to my suggestion to use pattern or design in your picture making with the camera. It is not revolutionary, but constructive. I will add: do not tear down anything you have built. It is not fair to criticize without suggesting an alternative; the destructive critic is a thief in intent.

A recent revulsion in art, which led men to painting queer shapes and queerer color-schemes on canvas, was occasioned by this lack of decorative sense. As one of the coterie explained, when asked about his idea of art: "I just got sick and tired of painting trees, streams and houses, houses, trees and streams, and streams, houses and trees." In other words, he railed at art because of his own lack of ability to see things in a better way, and took to painting the queer shapes in an effort to find a new world to work in.

The photographer is more happily situated in that the decorative sense may come to him much more easily, and he has only to put out his hand and grasp it. There is plenty for all.

By Way of Illustration

In preparing the illustrations for this monograph, I am submitting a rough pencil sketch, done in a few minutes, of each of the photographs chosen for this purpose, with the idea that these drawings will accent the significance of the pattern or design in the photographs in such a way as to make it easily understood by all. Incidentally, I would like to suggest that the reader will find in this rough blocking out of the design or pattern, generally obvious in his pictures, a very profitable exercise in the critical valuation of his work from this point of view.

Since they are my own, I propose to criticize these pictures as freely as I please. Apart from the possible helpfulness to the reader of this free criticism of a few pictures by their maker, I indulge the hope that the novelty of this audacity will add zest and interest to our adventure together in these pages.

**Print
Number 1**

This print, by the way, was exhibited at the Pittsburgh Salon of 1919. The pattern on which the composition is based, as seen more clearly in the rough sketch which accompanies it, is perhaps a little incoherent—in a Japanese way. I have seen many a Japanese print with the same incoherence of pattern. In the sketch it does not hang together, which is quite fortunate since it shows us how the uncanny ability of photography to render half-tones will often give an interesting effect or desirable result where another process might fail.

At the left of the picture we have a curious staccato set of criss-crossing rectangular lines, building up upon one another so that the eye is carried up into the picture, and almost at right angles across the top of the picture we have a belt of masses, dominated by a set of small triangles. I feel that the picture is a little monotonous, that there is no special point of interest in it, and that the eye wanders about seeking a place to rest. However, it is submitted as containing an essential set of lines and masses, in the selection and use of which is obtained what the writer is pleased to call design or pattern. If these pictures were all good ones, it would lessen the value of my discussion of them; fortunately, for our purpose, it is difficult to find seven good pictures among those available at the moment.

**Print
Number 2**

I reproduce this print for consideration on account of its curious simplicity, as an argument for simplicity in picture-making by photography. The subject, as it presented itself to the eye, was very unpromising; but, rather than go on my way without making an exposure, I made two negatives, very similar to each other and with little to choose between them. A print from the second negative, No. 2a, is reproduced simply to show that one may often get, from the same position, two radically different pictures by merely pointing the camera a little higher before making the second exposure.

To return to Print No. 2: The picture pleases me, first, because of its unpretentious simplicity, and, second, because of its almost mathematical balance. It is symmetrical in its sense of balance, yet there is nothing

symmetrical in its composition. All effort to introduce the element of human interest or life has been neglected in the search for balance of masses as the predominating interest of the scene. So heavy and somber are the masses that one might almost entitle the picture a still-life study of the docks. It was made on a Sunday, and the day was overcast with leaden clouds. It will be noted that the writer has a weakness for either a very high or very low horizon in his picture-making. This is not advocated specially, being merely characteristic of his personality. It is interesting, however, to note in passing that pattern seems to be more easily found in pointing the camera downward, or using the skyline high in the picture space, as may be observed in the works of those pictorialists whose pictures show a keen appreciation of the interest of design. It may be that the reason for this lies in the fact that there is often more material on the ground to work into a design or pattern than can be found in the sometimes confused masses of the near or middle distance of a scene. At all events, it is a method of treatment which forces whatever interest the design elements of a particular composition may offer, of which fact abundant confirmation may be found in the pictures of such workers as Coburn, Eickemeyer, Cazneaux, Porterfield, and many other American or foreign pictorialists.

Print In this attempt to express the feeling
Number 3 inspired by one of the great bridges
 which span the East River at New York
 City, the note of pattern is purposely stressed so that it dominates the composition. Some of it is staccato and quick in rhythm, like the high-pitched, quick note in a piece of music, interpreting the life and activity of the waterfront scene, and some of it is heavy like the base chords, forming a satisfying under-structure for the far reach and uplift of the span and distance in the upper half of the picture space. As I see it, this print very clearly shows the significance of design in picture-making, by means of which the compositional elements of principality, subordination, simplicity, unity, and the rest are more easily understood and provided for in camera work. The rough sketch em-

phasizes this, so much so in fact, that I think a more careful drawing of the subject would be preferable to the photograph in the matter of pictorial interpretation.

Print
Number 4

Here we have a design which is almost nonsensical, the humor of it being apparent at once. The three heavy spots, not quite symmetrical in placing, are well balanced and placed upon a rhythmic background of almost parallel lines, which, in turn, is interlaced with the shadow lines of branches of a nearby tree.

It isn't much of a picture, but will be useful as an illustration of pattern, the picture part not having been wholly lost in the search for pattern, as will be seen later. It is a very common treatment of balance, not pictorially displeasing, and offers a scheme used by many for lack of something better to photograph. It is not a subject which one would lightly let go by, but chiefly interesting as a study in balance rather than a picture.

Print
Number 5

In this print I have attempted to show the beautiful sense of Gothic architecture. The subject is magnificent enough, being the East Door of St. Thomas's Church, New York City. The photograph happened to be made primarily from an architectural standpoint, without pictorial intent, and the pictorial print was made as an afterthought. In making the original negative, the scale or size of the entrance was shown by using one lone figure in front at the proper point, much as an architect would make his sketch. More than one figure is not so eloquent in giving scale to a single architectural feature, but, of course, many figures may be used when showing a whole building to avoid the sense of bareness in the scene.

The sketch tries to show the design, more of the architecture than an attempt to weave a pattern into the picture. The architect here was the master mind; I could add nothing to his effort and had but to put it on paper. His design was sufficient. In such a case the interest of the photograph must lie in the proper presentation of the design inherent in the treatment of the subject itself. But, of course, I would not suggest photo-

graphing the general run of architectural subjects in the hope of thereby finding good designs. It will often happen, however, that in combinations of architecture and landscape the pictorialist will find many good subjects.

**Print
Number 6** This illustration may serve as a good example of what not to do. Pattern has been used here, but so roughly and crudely as to defeat its purpose and end in absurdity.

First of all, granting that the reverse curve is acceptable, which it is not in this case, it is obvious that a point of view should have been chosen further back, so that the curve would not have been cut off at the left. I realized this when about to make the exposure, but was too lazy to remedy the mistake—the snow was rather deep and heavy as I remember it. At any rate the picture did not show enough promise to urge any effort to better it.

Apart from this crude use of pattern, the picture is monotonous, the upper third an incoherent mass of foliage and snow, with no distinct message and lacking in beauty, while the lower part is too flat and unrelieved to offer interest. We see that the introduction of pattern or design does not necessarily add pictorial value, but only in the degree that the design gives esthetic interest and meaning to the decorative treatment of the subject. It is not a good picture.

**Print
Number 7** In this print we have an interesting example of the use of design in the treatment of an architectural subject. The pattern here is bold, composed of vertical lines or stripes, and the steps which show at the bottom of the picture. These last were included to give the variety of a new note in the composition and so prevent monotony. The picture happens to be strong in scale, which is often the case when using figures and bold verticals against a low horizon in architectural photography. The use of the heavy black masses also serves to add a dramatic note to the picture, which was intended to bring out by opposition the slender gracefulness of the Woolworth Tower placed almost central in the scene, with the New York City Hall seen in the middle ground.

**Print
Number 8**

I found this group of four views of the same subject in an English trade catalogue. It was there reproduced to show the capabilities of the Sanderson camera, in the direction of varying the interpretation of a scene simply by using the mechanical means offered by the movements of this camera. But it may well serve a further purpose here of demonstrating how the photographer can vary the interest of his work, by varying the pattern or design observed in any given scene when photographed from different viewpoints.

Fuzziness

A word about fuzziness and I am done. Fuzziness does not make a photograph pictorial, does not take the place of design, and plays no part in contributing decorative interest. Too many pictures have been praised or accepted and hung at exhibitions, merely because of their fuzziness, which, perhaps in part, may sometimes conceal the lack of other qualities. It has become a habit, this making of fuzzy pictures, because the fuzziness seems to make the picture more pleasing than a sharp photograph of the subject. But it is an evasion—the half truth which is worse than a lie. A good picture does not givadam whether it is sharp or fuzzy; it is a good picture just the same. The beginner in pictorial photography should write this on the tablets of his heart and be guided by it.

**Soft-Focus
Lenses**

Of course, this has reference to the use of the soft-focus lens, which has destroyed more pictures than it has made. I am an enthusiastic advocate of the soft-focus lens. It is one of the great delights in photography and of immeasurable value to the picture-maker; but it has its faults and limitations, and it should be used with keen intelligence and discrimination, which spell common sense. It has been abused most shamefully, chiefly by those who use it under the mistaken idea that it is the lens which makes the picture. The lens does not matter if the essentials of a picture are lacking. It can and will, if properly chosen and used, help in the single detail of diffusion in delineation.

JOHN WALLACE GILLIES.

THE PHOTO-MINIATURE BOOKS

COMPOSITION. A Series of Exercises in Art Structure for the Use of Students and Teachers. By Arthur Wesley Dow. 9th edition. Revised and Enlarged, 1918. 128 pages, profusely illustrated with line and half-tone engravings and color plates. 9 x 11. Paperboards, \$5.

PICTORIAL COMPOSITION AND THE CRITICAL JUDGMENT OF PICTURES. A Handbook for Students and Lovers of Art. By Henry R. Poore. 11th edition. Revised. 280 pages. Profusely illustrated. Cloth, \$2.75.

ART PRINCIPLES: With Special Reference to Painting; Together with Notes on the Illusions Produced by the Painter. 378 pages; 31 illustrations from the Masters. 1919. Cloth, \$3.50.

ESSAYS ON ART. The Education of the Eye. Practical Hints on Composition. Light and Shade. By John Burnet. 1882. Republished 1913. Fully illustrated in line and half-tone. Cloth, \$1.50.

THE A, B, C OF ARTISTIC PHOTOGRAPHY: Theory and Practice. By A. J. Anderson. 344 pages; illustrated. Third edition. 1917. Cloth, \$3.15.

In Memoriam

HENRY A. STRONG

We record, with great regret, the death of Henry A. Strong, which took place at his residence in Rochester, N. Y., on July 25, in his eighty-first year. For more than a quarter of a century, Mr. Strong was the president of the Eastman Kodak Company, which, by his passing, loses, with the exception of Mr. George Eastman, its strongest and most lovable personality. He was a man of unusual virility and charm of character, a citizen noteworthy for his integrity and usefulness to his city and state, broad in his sympathies and generous in his charities.

Mr. Strong was a successful manufacturer of whips when, in 1881, he first became interested in the photographic business of George Eastman, which enterprise he backed with a few thousand dollars, entering as a copartner in the firm of Strong and Eastman. A few years later the business had grown to such proportions that it was incorporated as the Eastman Kodak Company, and Mr. Strong relinquished the whip business to take an active part in the affairs of Kodak. In 1904 he retired from this strenuous activity, but remained on the board of directors as president up to the day of his death.

Of the influence of his character and example in the upbuilding of the great business whose destinies he helped to shape and control, there is no need to speak. He was a hard worker, best known and most loved by those associated with him in his work; always ready with a cheery greeting for those who came into contact with him, from office boys to fellow directors. His goodness was of the simple, spontaneous sort which overflows from a great heart and a cheerful philosophy of life. Generous in a big way to the charities of his home city, he was conspicuous, among those who knew him, for his thoughtfulness and consideration of the small things. May the earth rest lightly on him.

High Temperature Development

On another page of this issue of THE PHOTO-MINIATURE the reader will find an interesting note concerning the hardening of exposed plates before development at high temperatures, or under tropical conditions.

Herewith is republished, from *The British Journal of Photography*, August 8, the specifications of British Patent No. 128,337 (April 20, 1918), covering the preparation sold abroad as the Ilford Tropical Hardener, and manufactured by the Ilford Plate Co.

"According to the invention, a hardening bath is provided for treating gelatine-surfaced photographic materials prior to subjecting them to the action of a developer, which bath contains formaline, paraformaldehyde, or a compound from which formaldehyde is readily generated, together with a salt (for example, sodium citrate or sodium sulphate or di-sodium orthophosphate) of the class which tends to raise the melting point of a gelatine jelly and to retard or restrict the swelling of dry gelatine in water.

"The invention further consists in the process for developing gelatine-surfaced photographic materials at high temperatures consisting in first subjecting the material to a hardening bath such as above described, and then subjecting it to a developer. It is found that if a photographic plate, for example, be first hardened in the above manner, it can afterwards be developed or toned with ease by any of the known developers or toning baths at a high temperature.

"The class of salts referred to includes acetates, tartrates, citrates, oxalates, sulphates, phosphates, chromates, bicarbonates and borates.

"A formula for this preliminary bath may be as follows: 40 per cent formaline, $\frac{1}{4}$ oz; sodium

sulphate (crystals), 2 ozs.; (or di-sodium ortho-phosphate, 1 oz.); water, up to 10 ozs.; or if paraformaldehyde be employed, 50 grains of this may be used instead of the $\frac{1}{4}$ oz. of formaline.

"The above formula may be compounded and kept indefinitely, or the paraformaldehyde and sodium sulphate or other salt in anhydrous form may be made up as powders or into pellets and sold in this condition for dissolving when required in the necessary quantity of water.

"It has been found that by using this preliminary bath, photographic plates and other materials can be manipulated, that is developed, toned, fixed, washed or otherwise treated with aqueous solutions, at a temperature as high as 110° Fahr. without any cooling means being necessary. The salt retards the swelling and prevents melting of the gelatine while the formaline is penetrating and combining with it to form an insoluble film, so that even though the bath may be at as high a temperature as 110° Fahr. the gelatine has no opportunity to melt before it is hardened by the formaline.

"The advantage of using the above ingredients as a preliminary bath to a developing bath is great, as it disposes of the need of using a special developer. Further, the fact that no development is taking place during this hardening, enables the developing to be carried out afterwards without undue haste, whereas when the hardening material has been incorporated in the developer, the hardening action has scarcely begun before development is finished and this is so rapid that, as already stated, it cannot be controlled; moreover the hardening effect being imperfect, subsequent treatment, such as fixing and washing of the plate, is exceedingly difficult and at such temperatures as 100° to 110° Fahr. it is impossible even to complete development itself before the gelatine melts. When, however, the hardening is effected in a preliminary bath as described, the developing and fixing and washing can all be subsequently carried out in practically the same manner and with almost as much ease as would be the case if operating in ordinary temperatures.

"In practice it is usual to proceed with development immediately after rinsing off the excess of the preliminary hardening bath."

Commenting upon the above, the editor of *The British Journal of Photography*, says:

"The particulars given . . . suggest that the hardening qualities of formaline are very greatly intensified by the presence in the solution of a salt which retards the swelling of gelatine in water. Without having tried it, we should not expect the addition of even the considerable proportion of sodium sulphate to a 1:40 formaline solution to produce the remarkable degree of hardening which is exhibited by the Ilford preparation. It would seem that in some way or other a more powerful effect is produced by the conjunction of two, although it is obviously very difficult to say what it can be. At any rate the invention should prove a boon to users of plates or film in tropical countries and still more so on account of the fact that the preliminary bath may be used in conjunction with any formula of developer, and therefore leaves the photographer free to follow his own preferences in this latter respect."

Notes and Comment

DEVELOPERS. As far as I can learn, no German-made developing agents are as yet being imported into this country, their re-introduction here being hampered by the stringent control and regulations of the Import Licensing Board which is standing guard over our "infant American chemical industry." Elon (Eastman Kodak Co.) and Wallace's "Metol" (Special Materials Co.), the two standard American makes of monomethyl-paramido-phenol-sulphate (metol), are reported to be selling in a constantly increasing volume. Excellent varieties of Swiss and English "metol" are obtainable from G. Gennert, the Swiss product being largely favored by big consumers. I also hear of importations

of a thoroughly good "metol" of French manufacture which, however, is apparently being marketed without indication of its origin. Monomet (AnSCO) and Serchol (Willoughby), two British "metols" are prime favorites with professional, commercial, and "photo-finishing" houses. Johnson's Azol is generally reported to be replacing the formerly much-used Rodinal, and Acrol (Eastman Kodak Co.) is similarly said to be replacing imported Amidol. Paramidophenol, Amidol and Hydroquinone are now produced here by several chemical firms, but thus far no American manufacturer of any of them has had sufficient confidence in his product to put his name behind it.

PLATINUM PAPERS. The English-made Platinotype paper (Willis & Clements, Philadelphia) is again being boldly advertised in British photographic journals, and will doubtless be available on this side at an early date. Meanwhile I would like to report a genuine "find" in two platinum papers of remarkable quality, made in America. These are the "Sepia" and "Mezzotint" platinum papers manufactured by the Wallace Chemical Co., 100 Fifth Avenue, New York City. A few days ago I looked over a collection of prints on these papers which, in sheer quality and rendering of tonal values, equaled anything in my recollection of the platinum prints of the last twenty years.

TROPICAL PHOTOGRAPHY. At the British Scientific Products Exhibition, recently held in London, there was demonstrated a process for the development of photographic emulsions under tropical conditions. We quote from *The Amateur Photographer*: The materials are subjected to a brief preliminary treatment in a hardening bath containing certain salts in addition to formaldehyde, so that the softening of the film does not take place, even at temperatures as high as 120° Fahr. No further details are given, but the reader is referred to the summary of Crabtree's investigation of "Development at High Temperatures," given on page

506 of THE PHOTO-MINIATURE No. 168, or *The British Journal of Photography* of Nov. 2, 1917, upon which the process mentioned above is apparently based.

COLOR PHOTOGRAPHY. Mr. Friese Green, a pioneer worker in motion-picture and color photography, has perfected a two-color method of color photography which is to be introduced by the Imperial Dry Plate Co., one of the foremost of English dry plate makers. The new method is said to call for only a single exposure, and is adapted for use with cameras of the ordinary kind. The colors obtained are under control as far as local effects are concerned, give a bold approximation of the general color of the subject rather than an exact reproduction, and the results are capable of enlargement. I quote the editor of *The Amateur Photographer* and with him "look forward with interest to future announcements concerning" this promising process.

BRITISH CONVENTION. The thirty-first annual Photographic Convention of the United Kingdom was held at Oxford, July 7 to 12, under the leadership of Mr. G. W. Atkins, and is reported to have been wholly successful. It was the first meeting of the Convention since 1914. The meeting of 1920 will be held "somewhere in France."

Books and Prints

THE PHOTO-MINIATURE, NOS. 168 AND 171. The demand for these two issues has obliged us to issue new editions, which are now ready for delivery. No. 168: *Modern Methods of Development*, is a companion handbook to No. 167: *Modern Photographic Developers*. Apart from the fact that they are the only handbooks at present available on their subjects, these two monographs present the most practical and comprehensive

survey of developers and development ever published. No. 171: *Retouching and Improving Negatives* is a thoroughly practical and satisfying guide to the best methods of preparing negatives for printing by retouching with the pencil, brush, or abrasion methods; the use of etching tools, local intensification and reduction, working on the back of the negative with color or crayon, etc. Price 35 cents each, from all dealers.

NEW EDITIONS. Among recent importations from England, we have received new editions of "The Portrait Studio" by Practicus, price 35 cents; "Sketch Portraiture" by J. Spence Adamson, price 50 cents; and "Commercial Photography" by Practicus, price 70 cents. An attractive reissue of Anderson's "A B C of Artistic Photography," at \$3.15 postfree, is also available. This work, in many ways the most readable and satisfying guide to pictorial photography in the language, should not be confused with another book on the same subject written by another Anderson. Almost all the books available on photography, whether published here or abroad, have advanced in price, owing to continually increasing cost of production. Thus Johnson's "Photography in Colors" now sells at \$2.50; Roebuck's "Science and Practice of Photography," at \$2.40; Poore's "Pictorial Composition," at \$2.75; and Lan-Davis's "Practical Telephotography," at \$1, post-free.

GERMAN OPTICAL INDUSTRY. In an article on this topic in the *Central Zeitung fur Optik und Mechanik*, by Fr. Perl, a director of the Emil Busch A. G., the writer states that when he first entered the employ of Emil Busch, forty-six years ago, the entire German optical industry employed about 1,000 workers and assistants, earning a total of one and three-fourth million marks per annum. In 1913 the industry had grown to such an extent that it employed over 16,000 workers, earning at least thirty-five million marks per annum. About one-half of the product of the industry was sold abroad

prior to the war, but Fr. Perl does not speak optimistically as to this record being reached in the near future.

THE WATKINS MANUAL OF EXPOSURE AND DEVELOPMENT. The eighth edition of this popular guide has just been published in England. In the preface the author says nothing of revision or alteration in the text, but explains that the high cost of production has necessitated, in order to avoid an increase in the price of the book, the omission of the chapters on calculating time and temperature tables, printing on P. O. P., all the half-tone illustrations, and a few other non-essential items, with a paper instead of the familiar limp cloth cover. Burke & James, Inc., Chicago and New York, are the American agents for this and all the Watkins specialties.

THE ELEMENTS OF PHOTOGRAPHY. By Frank R. Fraprie. (Practical Photography Series, No. 8.) 59 pages. Paper covers, 35 cents; cloth, 75 cents. American Photographic Publishing Co., Boston.

In this handy little book Mr. Fraprie has attempted, with more than ordinary success, to compress into a few pages what the beginner should know about the elements of photography, theory and practice. It is an admirable first book to put into the hands of anyone who has just received his or her first camera, and wants to know about everything at once.

PICTURES OF OLD SAILING VESSELS. It is not generally known that the Obrig Camera Co., 147 Fulton Street, New York City, has for years specialized in the collection and sale of large photographs of all sorts of sailing vessels. The collection, which contains many notable examples of marine photography, sea gulls in flight, old wooden schooners, sloops, yachts, etc., is interestingly reminiscent of the days when America led the world as a builder of ships, and her sailing vessels were to be found on all the seven seas.



The Silhouette

Offers an attractive medium for showing the operation or use of many products. Here it illustrates the practical simplicity of Graflex operation. It is also effectively used in the advertising of shaving conveniences, portraiture, etc. Illustration used by courtesy of *Kodakery*



“Keep a Kodak Story of the Children”

For the illustration of advertising of anything connected with childhood, from a baby's rattle to a scout outfit, pictures of children offer an irresistible appeal.

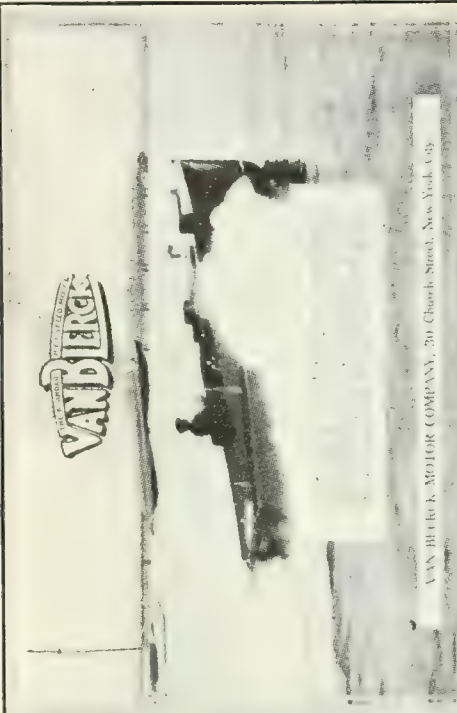
Used by courtesy of *Kodakery*



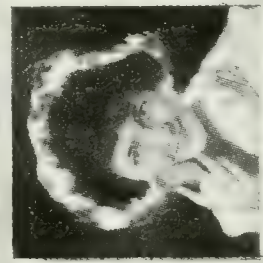
"Make the Kodak Record Autographic for the Days to Come"

Illustrating the special advantages of the Autographic recording device. A good example of modern pictorial advertising illustration.

Used by courtesy of *Kodakery*



VAN DUZEE MOTOR COMPANY, 30 Church Street, New York City



SEM PRAY
JO VE-NHY

In this portrait of Miss Anna Case (copyright by Strauss-Peyton, Kansas City, Mo.), we have an example of the use of the soft-focus lens in advertisement illustration. At the extreme right the use of a mirror gives obvious advantage in the display of women's underwear. The other two advertisements are self-explanatory



The Picture Tells the Story

A method very generally used by advertisers is the use of a photograph showing the product advertised, or its effectiveness in use, with the argument superimposed on the face of the print



Will they

WILSNAP

Fashions' Fastener

One of a series of remarkably clever advertisements of a dress fastener made by the Wilsnap Fastener Company, now appearing in the public prints. All the photographs used in this series are noteworthy for the charm of their appeal and the general treatment of the figure



A Poster Design

An early application (1899), of photography in the making of an advertising poster. Photograph untouched, from life, by Allen Drew Cook



CRYSTAL
Knit Fabrics
CRYSTAL MILLS, INC.

A KNITTED FABRIC IS
TRULY A SUPER-FABRIC.
A knit construction means these things:

A fabric that freely admits the cooling breezes in summer and oddly sustains the warmth of the body on chilly autumn days.

A fabric that gives freedom of movement and molds itself with peculiar grace to the body's lines.

A fabric that has decided character, lustrous durability, and lasting style.

THE CRYSTAL MILLS, INC.
THE TOMPKINS COMPANY, INC.
SOLE DISTRIBUTORS
354 FOURTH AVENUE, NEW YORK CITY

*N*AME FASHION never
settles for the ordinary and
the dull. It is ever seeking
new and better things to
wear. A dress made of knit
fabric is the answer. It
is the fabric of the future.
CRYSTAL MILLS, INC.
THE TOMPKINS COMPANY, INC.
SOLE DISTRIBUTORS
354 FOURTH AVENUE, NEW YORK CITY

THE CRYSTAL MILLS, INC.
THE TOMPKINS COMPANY, INC.
SOLE DISTRIBUTORS
354 FOURTH AVENUE, NEW YORK CITY

CRYSTAL MILLS, INC.
THE TOMPKINS COMPANY, INC.
SOLE DISTRIBUTORS
354 FOURTH AVENUE, NEW YORK CITY

The distinctive qualities of knit fabrics are suggested in this advertisement wherein the photograph is combined with a wash drawing decoration and supported by the typographical arrangement, the striking pose of the figure holding the attention



In illustrating advertisements of dress stuffs, the simplest treatment of the figure is often most effective as concentrating attention upon the qualities of the material.

Photograph by Charles H. Davis, New York



Illustrating the Slogan "Say It with Flowers"

Employed by a metropolitan florist to suggest the use of flowers for a wide variety of social occasions. Photograph by Charles H. Davis, New York



My Lady Looks in Her Glass

Daintily posed figure compositions of this sort are adaptable for many advertising purposes. Photograph by Charles H. Davis, New York



Illustrating a New Note in Spring Modes

Miss Peggy Hopkins in a beautiful East Indian silk brocade turban and a filmy chiffon slip-over finished with fur. Portrait by Alfred Cheney Johnston

The Photo-Miniature

A Magazine of Photographic Information

EDITED BY JOHN A. TENNANT

Volume XV

November, 1919

Number 177

Marketing Photographs for Advertisers

Of all the adventures in photography proposed in these pages since the beginning, that set forth in this issue undoubtedly surpasses all the rest in variety of interest and wealth of possibilities. It opens up a field of camera work wherein the ambitious amateur can find problems worthy of all his skill, with abundant pleasure—and profit if he will. It promises rich reward to the professional and commercial photographer, whose training especially befits him for its successful conquest. It offers an uncrowded and unusually profitable profession to anyone who will meet its needs with the joyous zest and anticipation demanded by all new fields. Need I say more to arouse the reader's imagination? This field is the use of photography in the illustration of advertising: the making and marketing of photographs for the use of advertisers. It is a field which lies at Everyman's door, stretches out to the farthest horizon of the world's activities, and runs the whole gamut of photographic achievement. The proof of all that is herein said concerning its allurements is not far to seek, but may be found in any newspaper, periodical, or advertising hoarding within grasp or sight.

The Daily Paper. Look at this morning's paper. It is a metropolitan daily, wherein the cost of a full-page space runs from \$1,200 to \$3,500 per insertion,

according to the day of the week and the position of the page in the paper. Today it shows a full-page announcement of ——'s flour. Three-quarters of the page are occupied by a photograph of a youngster "registering" blissful satisfaction over the goodness of a slice of bread and jam held in his hand. Yesterday it was a well-known typewriting machine, tagged with "14 points" of superiority, which occupied half of the full-page space. Or it was a full-page advertisement of a fire-extinguisher, a generous half of the page being taken up with a soft-focus picture of a fire at an eastern oil refinery, showing decorative masses of dense smoke. On Sunday the rotogravure "art supplement" contained a full page, pictorial portrait of a girl changing the record on a phonograph, without a line of advertising beyond the name of the phonograph; or it was a full-page combination of photographs showing the growing, harvesting and marketing of a famous brand of coffee, from the slopes of the Andes to the corner grocery.

The Magazines. Now let us turn to the current issue of a woman's journal of national circulation. It would take too long to analyze all its two hundred pages, but the first fifty pages of advertising show a full two hundred illustrations, two-thirds of which are more or less straight reproductions from photographs. The space in this journal runs from \$3,000 to \$7,000 per page for a single insertion. There are a dozen journals of this class. In like manner we may profitably run through a host of periodicals catering to the general reader, or to country life, farm, and garden enthusiasts, class and technical journals devoted to special interests, all crowded with advertising pages rivaling the reading matter pages in lively interest, and much of this interest centering in their illustrations. Do you see the market?

Commercial Booklets. Almost infinite in variety of interest and advertising-illustration opportunities are the commercial booklets (other than catalogues or illustrated price-lists) published by manufacturers or those supplying services of one kind or another. Note a booklet sent out by the —— Steel and Tube Co. to advertise the wear-resisting quality of its steel drills.

Every one of its hundred and fifty illustrations is a reproduction of a photograph. These display almost every variety of advertising-illustration from the straight commercial print to the pictorial portrait. Or it is an illustrated booklet of Coast resorts, its pages teeming with picturesque bits of life and scenery along the railroad or steamship line advertised—all photographs. Think of the market for this class of illustration.

Hoardings. Finally, we pause for a moment to watch a hoarding painter at work in the street. He is "roughing-in" the figure of an attractive bit of femininity engaged in fitting an everwear shoe to a dainty foot; or a happy party of young people alighting from a motor car to enter a roadhouse—and he works from a photograph.

There is no need to go further, and the few illustrations of this issue are pure surplusage. On every hand you may find the illustrated advertisement, and everywhere the use of the photograph. There is a wonderful market for the profitable sale of these photographs.

An Important Point. In any study of the advertising-illustration field from our viewpoint as photographers, it is important to remember that the outlay or investment of the advertiser covers the preparation of the advertisement as well as the space it occupies. And naturally the higher the price of the space used, the more the advertiser will pay for the preparation of "copy" likely to make his space investment as profitable as possible.

Prices. This has a very practical bearing upon the remuneration obtainable by the illustrator for his work. In practice it amounts to this, that the advertiser will pay any reasonable sum for illustrations which appeal to him as likely to help him sell his product; with the result that advertising-illustration work is usually paid for on a much higher scale than prevails in other branches of photography, such as portraiture or commercial work. For example: a commercial photographer who regularly supplies a certain wall-paper manufacturer with photographs of his products at \$5 for the first print, recently offered his client a series

of ten prints made with a view to their use as illustrations for the manufacturer's advertising. The set of ten prints was accepted at \$250. So a figure portrait, such as the professional photographer supplies to his clients at from \$5 to \$10 per print, may well be worth \$25 to \$50 to an advertiser who sees in it possibilities for the illustration of an advertisement of his product. For example: one Fifth Avenue professional using models and spare hours in the work, found a ready sale for pictorial portraits of this sort to advertisers at \$25 each, and another sold a set of portraits of operatic stars, at a desirable price, to a silk manufacturer who featured them in his advertising. Today the same advertiser is featuring a series of portraits of famous stage or screen beauties. These point to revenue producing material which many professional photographers have on hand or can easily provide. Similarly a "fake moonlight" view, showing the moonlight dancing over the rippled surface of a lake or an incoming seatide, such as almost any amateur can secure with a Kodak and would ordinarily sell for magazine illustration at \$1 to \$5, may well be worth \$25 to a silk manufacturer seeking to market a special line under the trade-name of "Moon-Glo" silk. It is impossible to give any standard scale of the prices asked and paid for this sort of work. In the purely commercial grades the prices range very little higher than ordinary commercial photography. But wherever individuality of conception, method, and execution enters, the price is usually whatever the buyer will pay. In other words the selling price of advertising-illustrations depends upon their value for use in the eyes of the advertiser, rather than upon ordinary print values. If you offer the advertiser something he wants, as likely to help him sell his goods, he will willingly pay any reasonable sum to secure it for his use.

Beginnings. This field of golden opportunity, this market-place crowded with eager and lavish buyers, did not come into existence over night. It had its beginnings twenty years ago, *circa* 1900, when the development of photomechanical processes made it possible to use the photograph on the printing-press. The first

photographically illustrated advertisements were crude compared with the results we see today; but the more vital fact is that there are larger opportunities for improvement, and a wider use of the photograph in advertising today than there were in the beginning. True to its purpose, *THE PHOTO-MINIATURE* "blazed the trail" into this new field as early as 1904, presenting in No. 63 of this Series an illustrated monograph on "Photography in Advertising" by Joseph H. Adams, who had done notable work in this specialty. But the message was ahead of its time and was largely unheeded. Thus, a prominent photographer, speaking of his success in advertising-illustration at the recent National convention, complained to his brother photographers as follows: "To my knowledge there has never been an effort made to broaden the photographer's business possibilities, or to suggest other fields for the technical knowledge he possesses." This, in the face of the work of *THE PHOTO-MINIATURE* during the past twenty years, and the persistent efforts of the Eastman Kodak Company and other photographic concerns, to induce photographers to do just what this speaker urged them to do, is typical at once of the ignorance and sleepiness of the professional and of the narrowness of his viewpoint in his profession. I am hopeful that, under the changed conditions of today, this little book will really accomplish its purpose and direct many photographers, amateur as well as professional, to a field wherein they may "broaden their business possibilities" and utilize all "the technical knowledge they possess" for the world's good and their own enrichment.

Today. The time is ripe for such an awakening on the part of photographers. Ours is a pictorial age. The end of the world war has opened a thousand new fields to manufacturers and advertisers the world over. These, thanks to the pioneers, are keenly alive to the value of illustration in advertising, and spend unstintingly for pictorial material. In supplying this material we watch a fight-to-the-finish between those who use the camera and those who employ the pen, pencil and brush. There can be little doubt as to the

ending of this unequal contest. Apart from the unrivaled facility of photography as a method of delineation and reproduction, the vital purpose of the advertising-illustration is to convince. As L. B. Jones, of Kodak, says: "The picture, if used at all, must tell the story;" or, as another writer phrases it: "The picture must make the truth sound true." In this—the telling of the story, the convincing of the observer—the camera is mightier than the pen or brush. Witness the motion picture!

The Why of Advertising. In entering this field of advertising-illustration, the photographer must first concentrate his thinking upon the aim and end of advertising in general, and the purpose and significance of advertising-illustration in particular. The end and aim of advertising is to sell something—service or goods. As here used, these two words must be given the broadest possible meaning. Service means inspiration, ideas, faculties, habits, labor. Goods may mean anything, from "hooks and eyes" to your soul's salvation. Nay, more. I have seen an advertisement sell, for cash in advance, something which had no existence, and so named that no mind could conceive the nature of the thing advertised and sold!

How Advertising Sells the Goods. As means to this end, advertising must appeal, arrest the attention, suggest, interest, impress, demonstrate, persuade, convince, and awaken desire. This is accomplished, if accomplished at all, by the form and "argument" of the advertisement. But always these are means and not ends in advertising. The perfect "argument" in perfect form does not guarantee the best advertisement of any given article. The best advertisement is that which sells the goods, since that sort of advertisement perfectly fulfils its single aim and end. Advertisers do not advertise to hear themselves talk, or to see the virtues of their goods extolled in print, but only to sell the goods. In which brief consideration, which might be expanded to fill a bulky volume, we sum up the significance of advertising-illustration in all its force and possibilities.

Why Illustrate Advertising? The appeal of the

picture, its power to arrest and compel attention, its aptness in the telling of a story, its ability to stir the imagination, to awaken desire or rouse to action, and its power to convince, need no word of mine by way of explanation or justification. The picture speaks a universal language understood by all sorts and conditions of men, illiterate or cultured, civilized and uncivilized. Its virtue lies in the directness and simplicity of its appeal. The picture of the youngster enjoying his slice of bread and jam, suggesting the use of ——'s flour to the people of New York, carries the message and speaks as effectively to the Bedouins of the desert, the natives of Patagonia and the Fiji islander.

Kinds of Advertising-Illustration. Now let us abandon these "glittering generalities" and "get down to brass tacks." What kinds of photographs are sold to and used by advertisers? The answer is: almost every conceivable sort of photograph. We may attempt to classify them by their obvious qualities, e. g. as technical or pictorial. In each of these classes we may recognize clearly defined subdivisions, viz. straight photographs of the commercial sort, retouched or "worked-up" photographs, combinations of photographs, and combinations of photograph and design. Or we may divide them into three classes which (1) simply reproduce the physical appearance of the thing advertised, "naked and unashamed," or (2) suggest or show its use or certain advantages in its use, special qualities or points of superiority in design or use over similar competing articles, and (3) have nothing to do with the article advertised, but serve to isolate the advertisement from those about it, compel the attention or win the interest of the reader and so cause him to read the advertisement, suggest an idea, add decorative effect, or increase the selling power of the advertisement. Very often the connection between the text of the advertisement and its illustration may seem to be remote, as when a New York ladies' outfitting house decorated its newspaper advertisements of silk underwear with fragments and borders lifted bodily from the architecture of ancient Greece. But the idea was sound.

The illustrations served to isolate the advertiser's announcement from its ultra-modern surroundings, arrested the attention of the reader by the note of contrast and dramatic touch, and lent the charm of beauty to the otherwise commonplace typographical display.

The Vital Thing is to study the market, keep always in mind the end and aim of the advertisement—to sell the goods, and to produce photographs which the advertiser will want, as likely to help him sell the goods. This covers everything and applies with equal force to speculative and made-to-order work. From this point of view, the chance snapshot of the 1910 European trip, showing a Belgian dame of seventy summers making Malines laces, will bring its price from the importer or manufacturer of laces quite as effectively as the elaborately finished commercial illustration showing the debutante of 1920 attired in the newest creation of filmy dream stuff.

Special and General Work. As matter of fact, the reader who sets out to do things worth while in this field will either specialize in some one line or method, or follow any and every method which promises success. There is an infinite variety of special lines, and an equal variety in the technical methods one may follow. These latter will be dealt with later, but a word may be said here of special lines. Thus one may profitably devote himself to securing pictures of children and childlife, bringing his little models into all his work. "The showing of children in advertising has grown amazingly during the past few years. . . . The magazines fairly gurgle and goo with kiddies" says a writer in *Printers' Ink*. Another may cultivate some individual or novel style in lighting effects, as Baron de Meyer has done, by which means the character of advertising-illustration may be wholly changed in charm and appeal. A third may win success by characterizing his work with the element of humor, presenting the sunny side of human nature, as exemplified in the advertising of certain smoking tobaccos in current weeklies, dailies, and monthlies of large circulation: And so on "world without end." The field of advertising-

illustration offers opportunity and reward for every talent, and the worker blessed with a vivid imagination will generally outstrip his fellow worker who travels along the well-worn ways of the usual thing.

Equipment. From what has been said it is plain that the equipment of the advertising illustrator must be personal (mental) as well as physical, and that this equipment differs according to the kind of work in hand. Thus the man who devotes himself to straight commercial work needs chiefly a wide technical knowledge of photographic methods, together with the commercial photographer's equipment of tools and resources. If he undertakes the supplying of "retouched" or combination work, wherein the photograph of the article advertised serves only as a base for the finished design, then he must add a knowledge of the "art work" here demanded. Then there is the man who specializes in that variety of straight photography which, without retouching or afterwork of any sort, still has the peculiar quality required in advertising-illustration. This sort of work calls for the ordinary physical equipment of the professional studio plus pictorial feeling or ability in the photographer. You see examples of it in the advertising-illustrations of Hillyer, of New York, and Hutchinson, of Chicago. These are illustrators rather than simply commercial photographers. They use the camera and lens as tools, and their work is interpretative rather than demonstrative in character, suggesting, awakening desire, and so on—but selling the goods. It is an essential part of the education of the advertisement-illustrator that he should study what is being done today in this field; learn to recognize the motive behind this or that style or method; and so acquire the imaginative force and ability to create which leads to success. In this the amateur can do all that the professional can do, despite shortcomings in technical equipment. Even with the tiniest Brownie you can make pictures which will sell goods.

Getting into the Game. With this survey of the field, its opportunities and requirements, we may now consider the problem of getting into the field for results. In this there are two ways: First, by speculative work,

which the amateur or professional photographer may do in spare hours, as an occasional method of supplementing his income. Second, by entering the field as a means of livelihood or profession, pushing it seriously and building up a connection among advertisers or advertising agencies, so as to secure a steady volume of made-to-order work and special commissions.

A Beginning. In either case, the simplest beginning is to attempt the illustration of an idea which seems to have advertising or selling value, connected with a product in everyday use, and to submit the finished result to the judgment of an advertiser of that class of goods or the illustration department of an advertising agency. The advertising-illustration competitions held annually by the Eastman Kodak Company offer a very practical opening for such a start, and more than one successful advertising-illustrator of today owes his success to these competitions. The requirements are simple; there are graded competitive classes; substantial rewards are offered in the shape of cash prizes, and the competing pictures are judged by a fair and competent jury. The idea here is to obtain illustrations which will help to popularize and sell Kodaks, by showing how useful or desirable a Kodak is in every phase of life from the cradle to the grave. Similar competitions are offered by other advertisers and announced in the public prints from time to time, such as the Ansco Loveliest Women Competition, the Good Roads Movement Competition, and others. The amateur or professional who will enter such a competition and put forth the best there is in him, will thereby gain a practical training which will thereafter serve him most usefully in this field of work.

The Idea. Remember first and last that the idea is basic in all advertising-illustration. In speculative work an idea with selling power in it will often secure the acceptance of your work, even where the illustrative quality of the work itself is below par. In made-to-order work, of course, the idea is provided, and success depends chiefly on your skill in its illustration or presentation. First, get the idea, an idea which will make people want to possess or use the thing advertised.

Visualize or actualize this idea, live with it and put it in action again and again until you have learned its strong and weak points, so that you can emphasize, subordinate, or control these when you embody it in the photograph. Choose the technical method of presentation carefully, and determine your treatment of the subject beforehand. If it is a breakfast food or other definite, physical thing, think out how to present it in some new or attractive way; if it is a service, such as a correspondence course in accounting or business efficiency, plan its illustration so that the man or woman ambitions to grow in these departments will be attracted to the scheme and convinced of its practical advantages. Be sure first of your basic idea, strive to get into your presentation of it the elements which will "put the idea across," novelty, interest, sentiment, action, naturalness, pictorial value, or whatever the idea calls for. Select your location and models, if these are employed, rehearse the method, and then make the picture or series of pictures. Try to avoid the commonplace and obvious, unless you can invest it with some compelling quality. Avoid the hackneyed theme and the bizarre effect—unless you can use them so cleverly that these will be overlooked or forgiven in the interest of the presentation as a whole. Use your imagination, so that the picture will tell the story and do the one thing necessary—awaken the desire of possession and sell the goods.

Speculative Work. If the idea on which you are working concerns something already advertised in illustrated form, think out a method of presentation which will appeal to the advertiser as an improvement upon the advertising in current use. For example: suppose the case of a perfumer advertising his product in the old-style way, displaying it in bottles or elaborately boxed as sold by druggists. It may be that you can enlist his interest and sell him your work by showing him a series of photographs wherein his perfumes are attractively combined with the flowers or blossoms from which (in theory at least) they are derived. Thus, a bowl of roses, or a spray of wistaria or hawthorn blossom tastefully arranged in a slender vase, with the pleasing reflection of form given by a glass-topped support, the

bottle of perfume being suggestively introduced in the pictorial scheme, will attractively link the suggestion of fragrance and sweet odor with the product advertised, and so add to the effectiveness or selling power of the advertisement.

This example is chosen from actual experience and netted \$75 for the amateur who conceived the idea and worked it out; but it is typical of hundreds of others which may be schemed and profitably developed with little effort, and offers a practical way of getting into the game.

Made-to-Order Advertising-Pictures. An examination of the advertising pages of our newspapers, periodicals of every class, and commercial publicity literature will show that a large proportion of the photographs used for the illustration of advertising today is of the "made-to-order" variety, that is, produced to meet the definite requirements and specifications of the advertiser, or of the agency having charge of his advertising.

Commercial Art Studios. Many of the larger advertisers and agencies maintain photographic departments completely equipped for this work, as the most direct way to the illustration of their publicity efforts. In New York, Chicago, and other big cities there are dozens of independent studios devoted wholly to "advertising art," as it is called. The announcements of many such studios may be found in the Red Book or classified telephone directory of any given locality, *Printers' Ink* and similar publications. The way these "advertising art" studios go about the business may be glimpsed from the following advertisement of a New York studio. I quote: "After getting the advertiser's idea of what he is aiming to produce, we make sketches for composition and general arrangement. These are submitted to the advertiser or agency as preliminary sketches for general approval. The necessary properties and accessories are furnished and assembled. New and suitable models are secured and the compositions made according to sketch. From this photographic base the artist-illustrator builds his drawing, decoration, combination, lettering, etc., required to complete the advertisement.

"Modern lighting is a feature of today's work. The old, dull, lifeless photographic effect has been eliminated. We use the most modern methods.

"Special all-night service for agencies. Galleries never closed. Copy brought to us before midnight ready for delivery next morning."

Independent Workers. The existence of these organized and regular sources of production, however, need not bar or interfere with the success of the amateur or independent photographer in this field, any more than the professional portrait studio interferes with successful home portraiture by amateurs. Thus, apart from these professional advertising art studios, many professional photographers of national reputation are constantly engaged in producing photographic illustrations for advertising purposes. In New York such men as Alfred Cheney Johnston, Baron de Meyer, Charles H. Davis, John Wallace Gillies, LeJaren A. Hillyer, Harting, Underwood & Underwood, Mishkin, Abbe and others of their class are continually increasing their output in this field. As examples, take the clever illustration of footwear styles, by Baron de Meyer, in the March 1, 1919, issue of *Vogue*, or the illustration of a Milgrim suit, by LeJaren A. Hillyer in the same magazine. The use of a portrait of Anna Case, by the Strauss-Peyton studios, of Kansas City, among the illustrations in this issue of *THE PHOTO-MINIATURE*, and the similar use of portraits of operatic celebrities, by Mishkin of New York, for the advertising of silks in the rotogravure supplements of the Sunday newspapers, show how the files of the portrait studio may be turned to profitable advantage in the illustration of advertising. It would be difficult to imagine more alluring illustrations of the charm of styles in women's wear than are furnished in the portrait of Miss Peggy Hopkins, by Alfred Cheney Johnston, or the figure compositions by Charles H. Davis, among our illustrations. Obviously work of this class calls for more than ordinary ability, and the prices paid for it correspond to its high quality.

Business Opportunities. The opportunities for the amateur or independent photographer in this "made-to-order" illustrating are, of necessity, occasional only.

But they may be made quite as often as they happen, and sometimes open the way to very remunerative work. Such commissions are usually first obtained by the submission of speculative work, showing skill in some particular line, to advertiser or agency. I recall the instance of an amateur in a small, Middle-West town, unusually skilled in the portrayal of boy-life in the streets, who added considerably to his income in this way. Similarly, a photographer who had demonstrated his ability in the handling of draperies of all sorts, secured profitable commissions for the illustration of advertisements of papers and fabrics for wall decoration. The independent or amateur has a big advantage over the advertising art studios of the large cities in that he is on the spot, and there are advertising opportunities in every town and community. Wherever you have the production of things to sell, there you have all the inspiration, material, and opportunity necessary for the making of money in the illustration of advertising.

Considered as a Profession. In the case of a reader who plans to follow advertising-illustration as a profession, the essentials for successful work are (1) the persistent study of advertising, the products and methods of current advertisers, and every sort of specialized observation and reading which will stimulate the production of ideas, slogans, or phrases which will serve as bases upon which advertising-illustrations may be attempted; (2) the establishment of a connection with advertising agencies and advertisers, or firms whose products may be successfully advertised (sold) by the aid of illustration; (3) the introduction and use of methods of presentation which will directly help to sell your work to the advertiser.

Observation and Reading. Sufficient has been said on this topic to indicate the lines to be followed. Study the products in the market from the single viewpoint of your ability to supply advertising-illustrations likely to sell the goods, to make them known to possible users or buyers, to convince the public as to the advantages they possess over competing products, or to awaken in the public the desire of possession. Consider the

current advertising of a manufacturer: how you could improve its selling power; what illustration ideas or schemes you can suggest as likely or certain to secure a wider sale of the article or service under consideration. Read as widely as possible, especially in advertising journals such as *Printers' Ink*, to obtain the viewpoint of advertisers and advertising agencies. See how they look at the problem of selling goods; what they want, what kinds of illustration they seek, and so on.

Building a Connection. This is dealt with on other pages, as far as securing names or lists of advertisers and agencies is concerned. The actual building of a business connection consists of the use of these names and lists, by getting into actual touch with buyers of advertising-illustration, calling at the agencies, submitting your work or suggestions, making your facilities and qualifications known by any and every method suited to the case or circumstances. This, of necessity, involves time and waiting, as well as hustling while you wait; but commissions will come if you can show ideas with selling power and illustrations which tell the story or clinch the idea. Most often the first connections will be made by submitting speculative work. It is the work which tells—and sells.

Technique—Method of Presentation. Given a facility in conceiving ideas, which is acquired by patient cultivation, much of the advertising-illustrator's success depends upon his choice of method in presenting the idea, or the technical method of illustration. There may be call here for simple excellence of technique, as in producing a thoroughly good photograph of the goods advertised; or it may be that originality or the note of novelty in the method of presentation will win success. As with illustrators who use pen and brush, so with those who work with the camera, originality in conception of ideas, and individuality in the method of execution mean a regular succession of profitable commissions. The professional illustrator, therefore, should not overlook the advantages which follow the cultivation and mastery of some one style or method which he may make peculiarly his own.

Soft-focus Work. It has latterly been discovered that

the use of modern pictorial methods in advertising-illustration would, in many instances, add the charm of novelty to the illustrator's work and thereby give it a new value in the eyes of the buyer. An example of this application is seen in the use of the soft-focus lens in advertising-illustration which, in the hands of a few skillful workers, has practically changed the face of illustrated advertising during the past two or three years. The first effect of this method was to win, for those who introduced it, the quick recognition of the advertiser, with better prices than had hitherto prevailed. The secret of the attraction this method has for the advertiser is found in the fact that its subtle effects of light and shade, its subordination of planes and forms, its broadening and softening of the wiry definition given by the old-time lenses, gave atmosphere to the representation, giving an elusive air of elegance and refinement to the commercial product. Thus the soft focus advertising-illustration began to take on something of the decorative, pictorial or "artistic" appearance of the illustrations in the reading matter pages. It is true that the soft-focus lens has been grossly misused in this as in other photographic fields; but discriminatingly used it undoubtedly offers many advantages to the illustrator of advertising, especially in enabling the worker to give his work a bolder, broader feeling, in getting away from the uncompromising commercial quality and insistent detail of the earlier methods, by the subordination of non-essentials with a corresponding increase in the appeal and selling power of the illustration.

A remarkably clever example of this soft-focus work, exhibiting all its advantages and peculiar charm, may be seen in the advertisement of the Steinway piano in the October, 1919, issue of *The Century Magazine*. I think this was produced by Hillyer, of New York, who has done good work along this line. Other examples may be seen in the recent advertising of L. Adler Bros. Co. ("Adler Rochester Clothes"), Vogue hats, Rogers' silverware, Grinnell sprinklers, and in the advertisement of the Wollensak Optical Co. in this issue. It is extremely effective when combined with the

semi-silhouette method, where the figures in the composition are softly outlined against a quiet light. When employed for large heads, it is apt to result in modernistic or cubist effects, as in the advertising of Ide collars, where one is sometimes at a loss as to the anatomy of the subject.

Judging from certain qualities seen in a few examples of this sort of work, it would seem that some illustrators first photograph their subjects (especially where small models are used in the making of a genre) with an anastigmat lens, and thereafter enlarge with a soft-focus lens. The result is not always happy.

Life Interest. More and more we see the life or human interest being linked with the product in advertising-illustration. Thus, instead of the familiar can of Heinz' beans or Franco-American soups in the center of the advertisement, we see a charming interior of an Old-World dining-room, with the family assembled at the festive board and a daintily attired maid serving portions of the aforesaid beans. Or it is a girl dressed up to the minute, getting into a Rolls-Royce which stands in front of a carefully selected Colonial doorway—and displaying the latest in Peck & Peck hosiery in her action. This method of introducing human interest is extensively applied in many lines, as in advertising stoves, electrical household appliances, machinery and tools and even in advertising steel for sky-scraper construction.

Retouching—Modern Style. Until within the last few years it was accepted as inevitable that photographs must be retouched or worked up for advertising use. This brought into use the air-brush and other extraneous devices for the after-treatment of the photograph designed for advertising use—to emphasize detail, to brighten high-lights, and so on. Thus, the photograph was regarded as merely a beginning, and had only the value of a base; it was the retouching, the “artist work” as it is called, which gave it value and determined its cost to the advertiser. We have changed all that. Some photographer, entering the advertising-illustration field, had to find or make an opening for himself, and so bethought to produce advertising-illustrations with

the camera, retouched in the making and so requiring no expensive after-treatment or "artist work."

This new technique demands a man who can paint with light and lens instead of painting his incomplete photograph with brush and color. In short, the new retouching is the use of lighting effects, the illumination of the subject, and the control of plate and print so as to produce in the print just the effects or effect formerly gained by retouching and "working up." These special lighting effects are produced by special methods of illumination, by supplementary or local lighting, by the deft manipulation of point and broad light sources, by utilization of the reflecting surfaces of articles to give striking or decorative effects in the picture, and the use of local light controls to darken or subordinate details in the subject not needing emphasis in the print. Thus it is quite possible to get the most exaggerated wash-drawing effects—the bold sweeps of light and dark, the spluttering but oftentimes charming reflected lights, etc.—by straight photography in an unmanipulated print. It is in fact simply a question of lighting the subject and negative making. A simple extension of this retouching method is the working in a high or low key, i. e. using a limited scale of tones in the presentation of the subject.

Silhouette and Semi-Silhouette. This brings up the treatment of advertising-illustration subjects in silhouette and semi-silhouette, a technique which seems to be coming into favor. The silhouette is, of course, applicable only to certain subjects and chiefly those pictures in which the figure is introduced. But it offers a sufficient range of usefulness to make it worthy of cultivation. Thus, the silhouette of the upper half of a manly figure, seen against a window blind, showing dad or brother Will busy shaving, has been very effectively used as a poster for a shaving soap. It is equally effective for use in advertising-illustrations showing the use of things, as in the Graflex advertisement among the illustrations of this issue—and many other uses.

The semi-silhouette is still more effective and has a wider range of application. It is sufficient to refer, for

examples of this style, to the advertisements of silverware, where we see a newly married couple admiring a silver tea service, seated at a little table before a casement window of tasteful design. The charm of the silverware is in this picture suggested by gleam and reflection in a quiet half-light, the faces and figures of the persons in the group being only faintly shown in semi-silhouette against the light. The picture tells its story eloquently, has appeal and charm, persuades, convinces and, without a doubt, sells the goods.

The Eternal Feminine. A fruitful field for specialization in advertising-illustration is at hand in the universal appeal of the eternal feminine. The illustrator who excels in this specialty will always find a ready market for his work. It is difficult to think of anything in everyday life which cannot be linked, and profitably linked, with this appeal. Even articles designed and intended exclusively for the use of men can be more easily and more widely sold by advertising with the woman appeal in it than otherwise. In this method success depends upon skill in the portrayal of beauty in pictures of women. This means an intimate knowledge of figure composition, group-work, the balancing of light and shade, the treatment of the hands and feet, the rendering of textures and fabrics, and the psychological ability to evoke and control expression and emotion in the subject, so as to draw out and embody in the picture whatever charm and graciousness the subject may possess, or to add these virtues where the subject does not present them. You have examples of this in the pictures of women by Charles H. Davis among the illustrations of this issue.

The Hands. In how many advertising-illustrations do we see the hands displayed! Sometimes they are shown as examples of the beautifying power of creams and lotions, manicure preparations and appliances. More often they appear as busied with the product advertised. In any event the illustrator of advertising today will find it advantageous to make a special study of hands and their treatment in figure compositions. This subject is exhaustively dealt with in *THE PHOTO-MINIATURE* No. 172, to which the interested

reader is referred. For good examples of this sort of work see the advertising of Cutex and similar preparations.

Mirror Pictures. In the illustration of advertisements of certain lines, such as articles of wear, cosmetics, etc., the use of a mirror will often prove advantageous as enabling the advertiser to show two different views of the figure when this may be desired. An example of this use may be seen among the illustrations in this issue. The method has been successfully applied in advertising garments or dress accessories made of lace, to show the grace and draping qualities of fabrics designed for dress materials, and as an accessory in pictorial representations which adds the charm of repetition to the composition. The working methods employed in this kind of work are detailed by Charles H. Davis in *THE PHOTO-MINIATURE* No. 174.

Children and Child-Life. Pictures of children are obviously appropriate to the advertising of all articles belonging to childhood, whether articles of wear, food, books, or games. But the vital interest which centers in the child is today being widely used to add to the selling power of advertising of the most diverse classes of goods, and this interest well deserves specialization as I have already suggested on an earlier page. A readable paper on this specialty, by a writer close to advertisers, may be found in *Printers' Ink*, for October 9, 1919, and another article dealing with boys in advertising may be seen in the September 18 issue of the same journal. In this latter article the writer speaks of the possible advantage of enlisting youth in today's advertising campaigns as a means of moulding the youthful mind and so winning future business.

The Workman in Advertising. There can be no doubt about the practical value of linking the workman with his tools or appliances in advertising. The combination adds interest, concentrates attention, and so makes for greater selling power. A common fault in this class of advertising-illustration is artificiality and stiffness in the figure or figures presented, together with a suspicious cleanness and neatness in the clothes worn by the worker. This is generally due to the error of

taking the worker from his bench or machine and bringing him with his tools into the studio, dressed for the occasion. Illustrations of this sort should always be made in the machine shop or factory, with the workman actually on the job. In this way the picture will show the workman and his tools in their natural environment, the poses or action portrayed will be less forced and unstrained, ensuring a more vigorous result.

Outdoor Life. This field offers many favorable opportunities for the amateur adventuring into advertising-illustration. Some of its openings for business may be studied in the pages of journals devoted to outdoor life, such as *House & Garden*, *Country Life*, etc. A cursory survey of such papers will show that photographs of houses of unusual charm in design or location; entrance gates and fences of wrought metal, wire, or cement construction; portable garages, their environment and screening; formal gardens and garden furniture; roadways, paths, sidewalks, tiling for porches, shingles and roofing material, fancy bricks, heating apparatus, lighting fixtures, shrubs and trees, flower borders, special woods for interior finishing, bathroom and toilet equipment and accessories, irrigation and sprinkler systems, lawn sprayers, mowers, wirework for arbors and fences, poultry-houses, conservatory and nursery-equipments, and a thousand other articles necessary or desirable to those who live in the country, are all good material for advertising-illustration, and find a ready acceptance from those manufacturers who have the goods to sell.

The Straight Photograph. In the use of "straight" photographs for advertisement-illustration, accompanied by descriptive matter in type, two distinct varieties of illustration are employed today. It is important to note the differences between these two types of illustration, since one is much more readily salable and brings the photographer a higher remuneration than the other.

The first is an uncompromising commercial photograph of the article advertised, sharply defined or outlined against a white ground, perfectly reproducing

the form and appearance of the article as prepared for photographing under the skylight, and lighted in conventional fashion. This type aims at the perfection, in form, clear-cut detail, and mechanical accuracy of the old-style wood-cut illustration which it supplanted years ago. At first sight it would seem to be unassailable in quality.

A Variation. The second, more modern, type is an advance, being based upon a better appreciation of the purpose of advertising-illustration, which is not merely to show the article advertised, but also, and perhaps chiefly, to persuade its purchase—to sell the goods.

This second type is a photograph which, by its more subtle technical quality and method of representation, not merely reproduces the form and general appearance of the thing advertised, but also its surface, textural and material qualities—a matter of much importance in selling certain classes of merchandise.

Difference in Method. Photographs of this sort are secured in various ways, chiefly by abandoning the old, cut-and-dried, conventional methods of representation; by intelligent discrimination in the lighting of the subject; by insisting upon natural, unforced tonal values instead of the artificial or traditional effects produced by air-brush manipulation; by setting the object against a tint or tone background which, by slight variation in tone or tint, adds interest to the presentation of the article—this interest, however, being carefully subordinated. There is also the use of design or pattern where a group of articles are shown, giving a “happy” arrangement as compared with the formal array; and, finally, the restrained use of accessories appropriate to the everyday use of the article advertised.

The Better Method. This class of advertising-illustration is especially advantageous in the advertising of articles intended for personal use, where the appeal of surface, texture, and “feel” or touch is a factor in giving pleasure or satisfaction to the user. For examples, leather goods, silverware, glassware, textiles, or fabrics. I recall an effective advertisement of this sort in a

Sunday paper of a few weeks ago. It presented a gentleman's traveling bag in so attractive a way as to awaken the keen desire of possession, simply by the method employed in its presentation of the outward appearance of the bag. Similarly, in this type of photograph the charm of silverware, the sheen and refinement of its surface finish, the glint of light and reflection which it gives to the table, are all attractively displayed to tempt the prospective buyer. Another notable example may be found in the reproduction of fabrics, as in the visualizing or actualizing of the qualities of warmth without weight in woolen clothing or the soft flexibility and draping or plastic quality of silk textiles.

The point of the argument here is that this sort of advertising-illustration makes for greater efficiency—sells more goods, or obtains a better price for the article advertised, and so brings a larger remuneration to the photographer.

Selling. Having determined upon a definite line of experimental work, and embodied its illustration in form to your complete satisfaction, the next step is to sell the work. To do this find out whether the advertiser you have in mind directs his advertising in person or through an agency. Almost all prominent advertisers employ an agency, whose business it is to prepare their advertisements and place them in suitable mediums. In such a case it is better and more direct to deal with the agency from the beginning. Sometimes an advertiser, to whom an attractive scheme for exploiting his product has been presented, will take up the matter for himself and confer with his agency as to its use. But generally the advertising-illustrator will do better by finding the agency and dealing directly with it. In any event, submit your work to the advertiser or agency, with a suggestion of its use at a price, or submit it for approval and leave the price for use to be determined by after agreement. Where possible, this speculative work can advantageously be submitted by a personal call on the advertiser, or the person in an agency having charge of the advertising in question. Such calls are always made by appointment. But in most cases it will be better to offer to submit the work and, after a favorable

response, to send it by mail or messenger to the person interested.

Reaching the Buyer. The great majority of illustrated advertisements being prepared and put through by advertising agencies, it is important to have a fairly wide knowledge of the location and personnel of agencies handling the accounts of large advertisers. This knowledge, in particular instances, can be had by an enquiry addressed to particular firms in whose advertising you are interested as offering possibilities for your work. Or it may be obtained by a careful and persistent reading of such journals as *Printers' Ink*, from which the reader can readily compile a card index list containing the information he needs for reference. There is, however, a very complete guide or handbook to this field which I mention, not for advertisement, but for the reader's convenience. This is the "Standard Register of National Advertisers," published at the Times Building, New York City, and listing 10,000 of the largest advertisers in the United States in a bulky volume, published annually at \$25, with supplements giving revisions and corrections at intervals during the year at a further cost of \$25 yearly. This may seem to be a somewhat large investment for the speculative worker in advertising-illustration, but is really well worth its cost for the information it gives as to the market and how to reach the buyer. In practice the annual volume will probably serve the average illustrator two or three years with sufficient efficiency. Such a handbook to buyers will, of course, be indispensable to the advertising-illustrator who takes up this work as a profession and must, therefore, endeavor to obtain a regular connection with agencies or advertisers as a means of securing commissions.

Models. In working up advertising-illustration ideas, the use of models will often be necessary or desirable. These are not easy to find and their use is attended by many difficulties. In most large cities there are agencies or lists of models available, and inquiry at the local art school or the studio of an artist-illustrator will usually locate them.

In many states there are laws prohibiting the publica-

tion or sale of a photograph of a person without that person's written consent and permission. And there are on record many suits based on these laws, as well as attempts to blackmail by unscrupulous models seeking to share in the photographer's use of pictures in which their photographs appear. To avoid all difficulties of this sort, it is essential to secure from the model used a receipt for the payment made for his or her services, and a release covering all the model's rights in the use, sale, copyrighting, and publication of the pictures. This receipt and release should be executed in duplicate, so that you have one copy for the advertiser to whom you may sell the picture, and the second copy should be kept in your files for after use or reference. Where several models are employed in making a picture, separate receipts and releases should be obtained from each one. Where the model used is a minor, under legal age, as will often be the case, the receipt and release must be signed by a parent or the legal guardian of the minor.

Receipt and Release. A simple but sufficient form of such a receipt and release is as follows:

Date

Received from (Name and address of the photographer) the sum of (Amount paid to model) in full payment for services and all rights in photographs of me made this day by said (Name of photographer), with permission to said (Name of photographer), his successors or assigns, to use, sell, copyright, or publish said photographs for commercial or art purposes without further compensation to me; to which photographs I hereby release all claims, rights and titles.

Signed
(Name of model)

followed (in the case of a minor) by the name of the parent or guardian.

Motion Pictures in Advertising. The use of the moving picture in advertising, although more widely exploited than most photographers are aware of, is as yet in its infancy and offers a remarkably promising

field for cultivation. I cannot imagine why photographers are so indifferent to its business possibilities. The young photographer, who has acquired his training in motion-picture technique in recent army or navy service, could not desire a field more abundant in profitable opportunities for his knowledge and experience. Some of the larger motion-picture concerns, such as the Universal Film Manufacturing Company, are already seeking business in this line with characteristic energy; but its opportunities are as widespread as our cities and activities, and there is no reason why photographers in every section of the country should not find profitable openings for this class of work in their own localities. It is, in fact, a field offering peculiar advantages to the man on the spot.

Specialization. Obviously, the use of the motion picture in advertising calls for specialization, but in this it does not differ from commercial, professional or pictorial photography, so that the field is open to amateurs and professionals alike—to each according to his capacity. To work it successfully calls, first, for familiarity with motion-picture technique indoors and out-of-doors, as far as the making of the pictures is concerned. To anyone already trained in photographic work this offers little difficulty. Alertness and resourcefulness are essential. With these, there will also be needed a two-handed connection with local firms or interests which can be persuaded of their need for this sort of advertising, and a well-equipped motion-picture developing and finishing laboratory to which the films can be sent after exposure.

Getting Business. If the reader is a "movie fan" he is doubtless familiar with some of the more prominent motion picture advertising thus far attempted, such as the presentation of fashion modes in weekly screen reviews by local houses; the so-called educational films showing how certain commercial products are prepared and marketed; the personally conducted tour of an industrial plant in operation, and so on. These, however, are merely pointers indicating a few among the hundreds of ways in which the moving picture may be used to advertise the thousand and one things which

the world has for sale. The success of the photographic worker in this field, therefore, will depend in no small measure upon his ability in finding and suggesting the other ways in which the motion picture can advertise his local "prospects." This may mean the securing of an associate in the work who can "sell" the advertising and obtain commissions. Such a man usually is willing to work on the basis of a "drawing account" and a fixed percentage on all the business secured.

Team work of this sort is generally effective and gets results. Thus, a chamber of commerce may easily be persuaded that the visualization of the town's industrial activities on the screen, the picturing of its residential attractions, or its historical or scenic interests for tourists, will be profitable or advantageous to the community as inviting new industries, residents, or visitors. The sale of home or industrial sites, the development of agricultural, timber or mining lands, or of special industries may be promoted in a similar way—more effectively by the motion picture than by any other form of advertising. A striking illustration of the effectiveness of the moving picture in the development of grazing lands in Wisconsin and Michigan was given in a recent issue of *THE PHOTO-MINIATURE*, and similar campaigns have done wonders in promoting the apple-growing, salmon fisheries and other commercial activities of the Northwest.

Stereoscopic Pictures. In sending out salesmen to open up new agencies, says Ray Giles in *American Photography*, the manufacturer of a motor-truck found the lack of product-display a decided disadvantage in getting quantity orders for his product. The blue prints, photographs, and drawings carried by the salesmen fell far short of convincing the prospective agent of the "points" and peculiar advantages of the product. He wanted to see the truck "life size," to see it in operation before his eyes, to be able to look *into* rather than *at* its parts.

The solution of the problem was found in the use of stereoscopic slides, a set of these showing the product, its parts, and mechanical operation, being furnished to the salesmen, with a featherweight, folding pocket

stereoscope for the viewing of the slides. By this device the salesman was able to let his clients observe the product "life-size" with the illusion of relief and reality given by the stereoscope; he could see *into* its mechanical operation and judge of its distinctive points as certainly as if he had the truck itself before him. The method also offered the psychological value of placing something in the prospect's hands—something he could *feel* and make "work." It was completely successful in results.

Where Used. The market for this device lies chiefly among manufacturers whose products are too bulky, heavy, or delicate for the traveling salesman to carry with him, such as lathes, wood-working machinery, printing presses, stationary, gasoline and steam engines, cranes, electric motors, automobiles, tractors, agricultural machinery and the like. It can also be applied to showing the operation of a factory or industry, the arrangement and equipment of plants, etc., as vastly superior to the ordinary photograph.

The opportunity for the photographer here lies in his suggesting and supplying the slides and outfit to manufacturers, many of whom employ from half-a-dozen to half-a-hundred salesmen, whose equipment, as here suggested, would mean considerable business. The making of thoroughly good stereoscopic slides or transparencies calls for more than usual technical skill, so that the price asked for the outfits should be commensurate with the care and skill needed for their production. Obviously the specialty is one which the amateur could handle as successfully as the professional or commercial worker. The selling plan should begin with "sizing up" the industries of your locality, and the selection of the most likely users of the method offered. A sample set of slides should next be prepared for the demonstration of the method and its advantages. With this, an interview with the advertising department or salesmanager of the concern should produce the desired sales. Very little talking will be needed, the simple showing of the device and its points should be sufficient.

Specialized Markets. Leaving this consideration of working methods, let us look at the field of opportunity as seen from the viewpoint of special markets for

advertising-illustration. This means the cultivation of a special field of advertising, centering around a given industry or group of products, and working intensively to secure the business in that field.

Horticultural Advertising. For example, the reader may elect to concentrate on horticultural advertising, the making and selling of illustrations needed by seedsmen, nurserymen, tree and shrub specialists, forestry workers, fruit-growers, and florists. The market here is to be found in the numerous journals or periodicals catering to this class, producers and users alike. It includes, of course, the machinery, tools, and supplies employed in these crafts. Agricultural and farm advertising might well be combined with this field. The catalogues and booklets issued by those engaged in these industries, apart from their general and class journal advertising, involve considerable yearly expenditure and the necessary use of a large amount of illustrative material. The illustrator's success in this field depends upon his peculiar skill in photographing flowers and trees, gardens and shrubs, fruits and vegetables, farm produce, farm stock, and all the appliances and impedimenta concerned in this field. There is a wealth of information on part of this work in McFarland's "Photographing Flowers and Trees and the Use of Natural Forms in Illustration," while the photographing of live-stock is dealt with in *THE PHOTO-MINIATURE* Nos. 39 and 110.

Food Products. A similarly profitable market is open to the worker who will specialize in the illustration of food products and the appliances or machinery involved in their manufacture. This is a very wide field and calls for a broad knowledge of many kinds of photography. A survey of the advertising of the makers of cereals, breakfast foods, delicatessen and all food products intended for domestic consumption will best show the opportunities of this market for advertising-illustration. Looked at from the color viewpoint, it is seen to demand a special skill in the reproduction of colored objects, which means a practical knowledge of color plates and screens.

Textiles. Another field of advertising-illustration

which will repay special cultivation is that of textiles and fabrics for home decoration, house furnishings, dress materials, and wearing apparel generally, which may be taken to include things as diverse as feathers, laces, hats, shoes and leather goods generally, not forgetting parasols, umbrellas and canes. Here again the reproduction of color must have attention on the technical side, while all the illustrator's pictorial skill will be called for in the use of human models and tasteful arrangements of his illustrative material. As an example of the work in this field, I may mention the case of an upholstery journal requiring a color photograph of a home interior showing certain famous tapestries *in situ*. This called for an autochrome and the illustrator's charge for the plate was \$100. The remuneration in this field is generally high because of the difficulties involved in the work. For example: if the reader will try to produce a photograph of an ostrich plume, or worse, a bird-of-paradise plume, so that its distinct and unique characteristics and qualities are evident in the photograph, he will readily admit that such work must be well paid.

Jewelry and Art-Metal Advertising. An equally well-paid branch of advertising-illustration is that which covers the presentation of jewelry, gems, silverware, clocks, lamps, gas fixtures, electroliers and similar goods. Much of the illustration of this class of advertising at present is of the purely commercial sort, but there are opportunities for more profitable work for the man who can originate and produce illustrative material combining pictorial value and selling power with a thorough appreciation of the value of technical quality in his work. I recall the instance of an importer of fine clocks, generally cased in expensive woods, or art metal work, who sold his goods wholly by means of an illustrated catalogue and magazine advertising. His clocks ranged from \$25 to \$2,500 in price. When I pointed out to him that the illustrations in his catalogues gave no adequate idea of the beauty of his products to his prospective customers, he replied: "It is true, but I get the best photographs I can. I would willingly pay ten times present prices for illustrations which

would convey to the customer some adequate notion of the real appearance of my clocks."

Sporting Goods. The field of indoor and outdoor sports and games affords a market well worthy of special cultivation by the advertising-illustrator. Think of all the paraphernalia and equipments called for in these amusements for men, women, and children at home and out-of-doors, and you will see the possibilities of illustration offered by the advertising of these specialties. This covers not only the articles themselves, in the presentation of which chiefly technical skill is required, but pictures showing their manipulation and use, in the making of which one may need all the cleverness of the outdoor sports photographer (see *THE PHOTO-MINIATURE* No. 161), but the art of the portraitist in figure composition. Remember always that the advertising must "sell the goods." This may mean a pictorial interior showing a group of children on the floor watching the operation of an electrical railroad brought by Santa Claus; a group of horsemen in a close touch at polo; or the carefully chosen model (fairest of her sex) exquisitely poised for a high dive, standing in the latest word in bathing costume at the business end of the diving platform.

The Sign-Post to Success. In these and all other fields of advertising-illustration, whether general or special, whether undertaken for pleasure or profit, the sign-post to success reads: Make your picture tell the story. If it is an illustration of a farm implement, see that your picture shows its completeness for its purpose, its special construction, its advantages in operation and so on. If it illustrates the superiority of synthetic pearls over the real article, be sure that your synthetic pearls are so displayed, i. e. worn by so utterly ravishing a specimen of womanly beauty that the man who is to pay the price shall have no doubt whatever of their quality, and hasten to buy them. If the advertisement is to compel the inhabitants of Gotham to attend Billy Sunday's mission meetings and "be saved" from the wrath to come, see to it that your advertising illustrations compel attendance. The one is selling farm implements, the other pearls, and Billy Sunday's

"goods" are the soul's salvation. Make pictures that will sell the goods.

Here our adventure draws to an end. Despite the extreme brevity of its recital, I think we have seen sufficient of the possibilities and interests of the advertising-illustration field to enable the reader to estimate its value to him—as an amateur, for its pleasures; as a professional, for its profits. From both viewpoints it is summed up in the word visualization; the visualization of an idea by the illustrator, for the visualization of service or goods by the public, with the selling of service or goods as the end of it all.

BOOKS

The only handbooks dealing directly with the problems of the advertising-illustrator are THE PHOTO-MINIATURE No. 63. "PHOTOGRAPHY IN ADVERTISING." By Joseph H. Adams. 1904. Out of print, but available in many libraries.

"THE MOTION PICTURE IN ADVERTISING," by C. A. Dench (The Macmillan Co., New York).

THE PHOTO-MINIATURE Series, Nos. 48, 110, and 150, dealing with "Commercial Photography;" No. 165: "Unconventional Portraiture;" No. 172: "The Hands in Portraiture;" and No. 175: "Stereoscopic Photography," contain much useful information on these branches of work.

"THE PHOTOGRAPHY OF COLORED OBJECTS," by C. E. Kenneth Mees and others; "PHOTOGRAPHING FURNITURE" and "PHOTOGRAPHING PAINTINGS" are brochures offering practical methods for those interested in color reproduction. "A TREATISE ON THE AIR BRUSH," by S. A. Fraser, deals with the "art work" employed in preparing photographs for reproduction.

Apart from these, many suggestively valuable papers on various phases of the subject may be found in recent volumes of *Printers' Ink*, especially in Vols. 88, 89, 102, 106, 107, 108, *et seq.* These may be consulted in many libraries.

Notes and Comment

DEAR READER! You will note by an announcement made on another page of this issue that the price of THE PHOTO-MINIATURE is advanced from 35 cents to 40 cents per copy, and the yearly subscription rate from \$3 to \$4. I have resisted this advance as long as was possible, but there seems to be no way of avoiding it under existing conditions and so we must make the best of it. Briefly, the cost of producing and distributing THE PHOTO-MINIATURE has more than doubled during the past six months. The last few issues of the magazine have been published at a loss. As the magazine is not subsidized, this cannot be continued. Logically, on the facts of the situation, the price of the magazine should be advanced to 50 cents, but by means of certain economies in production, the new price has been fixed at 40 cents. I trust that the practical value of the service rendered by the magazine will persuade its readers and friends to continue their loyal and enthusiastic support as in the past, despite the increased cost.

R. P. S. The sixty-fourth annual exhibition of the Royal Photographic Society was this year held at the Society's house in Russell Square, October 13 to November 20. The exhibits totaled 375, this not including a collection of record photographs, 137 in number, of the South Pacific Islands, sent by Mr. Thomas G. McMahon. As in past years, the exhibits were divided into three classes: I—Pictorial Photographs; II—Color Transparencies and Prints; III—Scientific and Technical Photographs.

Despite the efforts of Mr. J. Dudley Johnston, who, during a visit here last spring, endeavored to enlist a wider coöperation on the part of American photographers, the list of 150 exhibitors shows only five from the United States and one from South America. This is lamentable from the viewpoint of the *entente cordiale*

supposed to exist between American and British workers and should be remedied in future years. The five American exhibitors were Dr. A. D. Chaffee, Charles H. Davis, William G. Shields, and Floyd Vail, of New York, and Dwight A. Davis, of Worcester, Mass. Among the illustrations of the catalogue, a charming "Mirror Portrait" by Charles H. Davis, represented the American exhibitors. It was, I am informed, made by the method described by Mr. Davis on pages 156-158 of *THE PHOTO-MINIATURE* No. 174.

A detailed review of the exhibition may be found in the October 17 and 24 issues of *The British Journal of Photography*. The fact that no medals were awarded in the Pictorial Section would seem to indicate that this section offered no work of outstanding quality. It is interesting to note that a large majority of the exhibits were printed on bromide paper. The Color Section is spoken of as disappointing in quality and number of exhibits, although two medals were awarded to Louis J. Steele and Lucion Talamon for their autochromes. No American work was shown in this section. Three medals were awarded in the Scientific and Technical Section, in which the most notable exhibit was a demonstration of the value of a method for producing grainless and filmless photographs. The details of the method are not divulged.

THE LONDON SALON held its exhibition this year in the Gallery of the Royal Society of Painters in Water Colors, during September and October, and is spoken of as being unusually successful in the quality and number of its exhibits. More than fifty American workers were represented, out of which remarkable showing thirty-three were members of the Pictorial Photographers of America. I haven't a list of these before me, but I am informed that Dr. A. D. Chaffee, Dr. Rupert S. Lovejoy, Francis O. Libby, Dr. J. D. Ruzicka, Charles H. Davis, Rudolph Eickemeyer, John Paul Edwards, William G. Shields, Sidney V. Webb, and Edward Weston were included in the galaxy. Some notable work was sent from Holland,

Australia, Japan, Egypt, Sweden, Spain, Canada (Travers Sweatman, of Winnipeg and Mrs. Minna Keene, of Toronto), and other "furrin parts." Doubtless we will see reproductions of some of these in the forthcoming issue of "Photograms of the Year 1919" which will be here in February.

PITTSBURGH SALON 1920. The seventh annual Salon is announced as to be held in the Fine Arts Gallery of the Carnegie Institute, Pittsburgh, Pa., March 1 to 31. The coöperation of all pictorial workers is invited. All prints submitted will be passed upon by an impartial and thoroughly competent committee of selection, and prints possessing the highest merits in artistic expression will be hung. No picture will be eligible that has been exhibited before in the United States. Entry forms giving full information and conditions governing exhibits may be obtained from Charles K. Archer, Secretary, 1412 Carnegie Building, Pittsburgh, Pa., the last day for entries being Tuesday, February 10, 1920.

MONOMET. The many users of Monomet developer will be interested in learning that the Ansco Company, sole agents for this product in the United States and Canada, has put into effect under date of December 10, 1919, a revised price list showing a reduction of approximately 25 per cent in the retail prices of the developer.

The new list prices are as follows: One pound \$15; One-half pound \$7.65; One-quarter pound \$3.90; One ounce \$1.

The Progress of Photography, 1916-1919

A PAPER READ AT THE CONVENTION OF
THE P. A. OF A., CEDAR POINT, OHIO, 1919

The progress of photography during the period covered by this report has, like all other mundane affairs, been conditioned almost entirely by the war. The war influenced photographic work in many directions, the most striking and important being the application of the camera as a weapon in the hands of the aviators. With the development of trench warfare it became evident that the effective utilization of artillery would depend upon photographic reconnaissance, and the armies developed the use of photography from the airplane for this purpose with great rapidity, so that, by 1917, there were frequent references in dispatches to the numbers of negatives which the aerial photographers had taken; in 1918 one of the Allied armies alone took more than a million negatives and made over six million prints.

With the entrance of the United States into the war, the energies of all concerned with photography in this country were at once devoted to the equipping of the Photographic Division of the Army. Our allies brought us models of the cameras which they were using, and these were modified to make them satisfactory for American manufacturing conditions and copying in quantity. At the same time, experimental work was pushed forward in this country, and new types of cameras were designed which, by the time the armistice was signed, were being produced in large quantities. At the outset the stock of lenses available was not sufficient for the Army and Navy, the lenses required for airplane photography being of long focus and large aperture. The need was met by the ready response of the photographers of this country to the request that they should turn over their lenses, and a sufficient

supply was obtained to fill the gap until American-made lenses could be produced in sufficient quantity. In the end, lenses of great size and of excellent quality were produced in this country, and had the war continued there is every reason to believe that the United States would have been in a position to supply lenses, not only for its own army, but for those of its allies.

The response of the photographers to the demand for men was no less prompt than to the request that they should surrender their treasured lenses, and the Photographic Division of the Army was recruited very largely from the ranks of the professional photographers, about 50 per cent of the men passing through the School of Aerial Photography at Rochester having had previous experience in a studio. Of the work done by these men in France there is no need to speak. They took part in all the work of the American Army and carried out their work as might have been expected of them.

In another branch of the military service besides that usually associated with photography, an immense amount of photographic work was performed. I refer to the Medical Service, in which X-ray photography played a most important part at the front. The use of X-ray photography in the war, indeed, has greatly stimulated the use of X-ray apparatus and materials, new portable apparatus being developed which makes it possible to use the X-rays in hospitals with a far simpler and less cumbersome apparatus than that which was used previously for the war. We may expect to see X-rays used far more in the future, both in the medical and dental practice, and also in the industrial arts, since X-rays are now being used very largely for the examination of metals in order to detect flaws and in order to study the structure of joints. It is not my purpose to dwell on the scientific application of X-ray photography; it is enough to mention in passing that the examination of crystalline substances by the X-rays bids fair to be the most important step in the advancement of modern science.

Just as the war led to the development of new methods of X-ray photography, so the experience in aerial photography has led to surveying by photog-

raphy, and it is to be expected that this will form an important field of photographic work in the future.

Indirectly, the war made it necessary for the manufacturers of photographic materials to devote a great deal of attention to the production of the raw materials from which photographic goods are made. Through the cutting off of foreign papers and gelatine a great development of home industry in these became necessary, with the result that this country is now self-supporting in these important requisites, and we may expect that the study of the raw paper and gelatine by the photographic manufacturers who are utilizing them will result in considerable improvements in their methods of production and in the product. In the same way the dye industry in this country has been greatly stimulated so that a great many of the dyes which were imported are now available here, and developing agents which formerly were largely imported are now manufactured in the United States in growing quantities.

Turning to general progress in the photographic field, I may mention the developments which have occurred in photographic theory, though I am aware that this subject is not likely to be of great interest to the practical man, since the application of photographic theory to practical photography is generally remote. The laboratories which are working on photographic theory are now studying very carefully the subject of tone reproduction; that is, the way in which the scale of lights and shadows of the original subject is translated into the print, the scale receiving certain modifications as it is reproduced, first in the negative and then in the printing process. Closely connected with this subject is the study of the color of negatives and the effect of the color produced in negatives developed in pyro and similar developers upon the reproduction. An important step in the theory of lens optics was made when Twyman applied the interferometer to the study of photographic lenses, an instrument which enables certain analyses to be made of the image-forming properties of lenses which could not be performed without its aid.

In motion-picture photography there has been a

continuous improvement in photographic quality until today most pictures produced by the larger firms are marvels of photographic skill, the lighting and composition being studied with the greatest care, and all technical qualities in the photography being beyond reproach. Far more of the film is being tinted and toned than used to be the case, and the choice of coloring methods is now of the utmost importance in the finishing of motion pictures. During the last year there have been introduced continuous machines for the printing and finishing of motion-picture positives which may eventually supplant the older methods of handling the stock. The progress of this will be observed with interest by all those concerned with the subject.

In color cinematography the tendency is distinctly toward the use of subtractive processes in the place of additive processes, which have hitherto held the field, and a number of firms are working along processes employing the super-position of complementary pictures which by their unison give a satisfactory suggestion of the original. Color cinematography is, however, still in its infancy; no developments of importance have occurred in stationary color photography during the period covered by this report.

In amateur photography the most outstanding fact is the increase in the importance of the work of the amateur finishing firms, who are now employing considerably more advanced technical methods with improved apparatus, so that it is evident that the finishing of amateurs' pictures will be an even more important branch in the future than has been the case in the past.

All branches of professional photography have been flourishing. In spite of the loss of men to the war, professional photographers have been able to continue their important work and have never been so busy as during the war period.

Work in home portraiture is extending, and there is an increasing use of film by professional photographers in the place of plates. In Great Britain, and in a few places in this country, there have been introduced what are known as "moving" portraits, in which two or three portraits are printed by means of a screen upon

one sheet of paper, the screen being moved sideways so that they come into view successively, giving the impression of a portrait that moves. This does not seem to have any artistic possibility and is interesting only as a novelty to attract attention.

The great development of commercial photography is continuing. In all directions photography is being applied for the preparation of catalogues and illustrations, and it is more and more being used in the industries themselves, both for recording the progress of work and for studying the product. This line of work is developing very rapidly, and is one which professional photographers are peculiarly fitted by their training and experience to undertake.

There is no doubt that the future is bright for photography. Owing to the important part which photography played in the war, increased interest in its usefulness has been aroused all over the world, and this will stimulate the study and practice of all its many applications. The great number of those who, while in the army, were brought into contact with the practice of photography, has further extended the ranks of its serious workers, so that we may look forward to a greatly increased use of its processes and methods in the world's work from this time forward.

C. E. KENNETH MEES, D. SC.

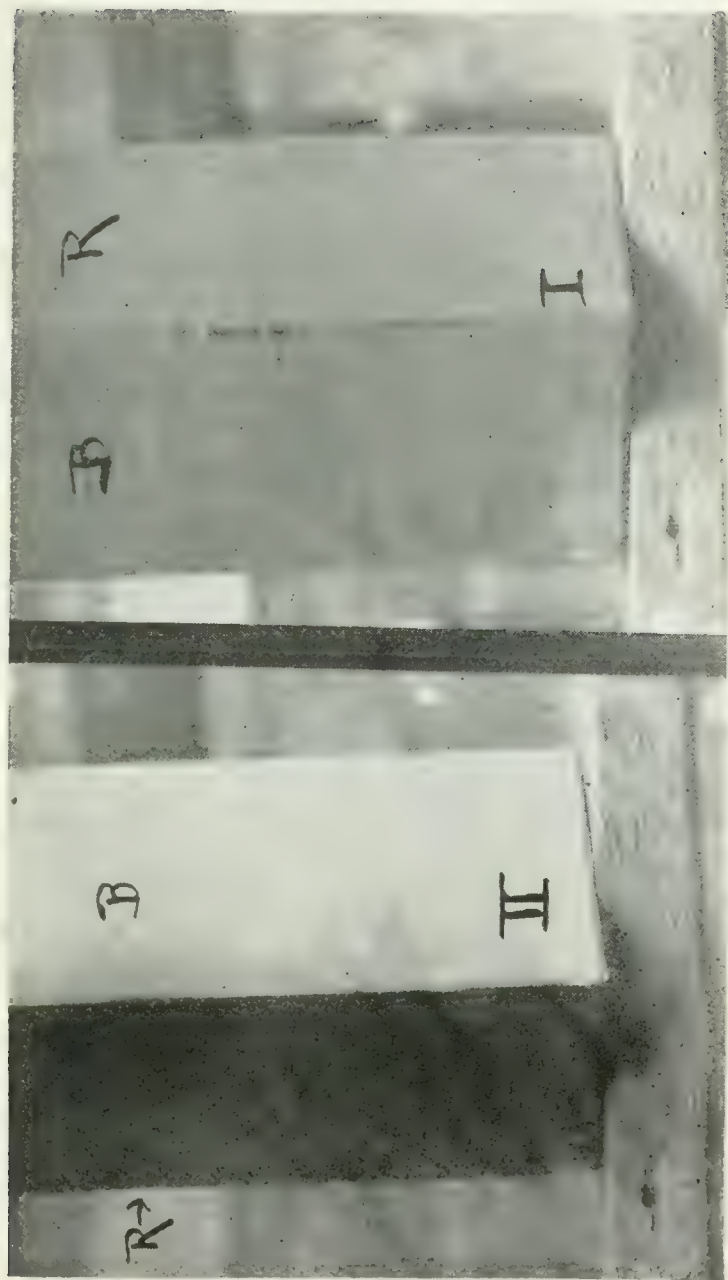


FIG. 1

Figs. 2, 3, and 4 will be found in the text



FIG. 5
Reproduced from a Platinum Print
T. O'Connor Sloane, Jr.



FIG. 6
Reproduced from a Pigment Print
T. O'Connor Sloane, Jr.



FIG. 7
Reproduced from a Pigment Print
T. O'Connor Sloane, Jr.

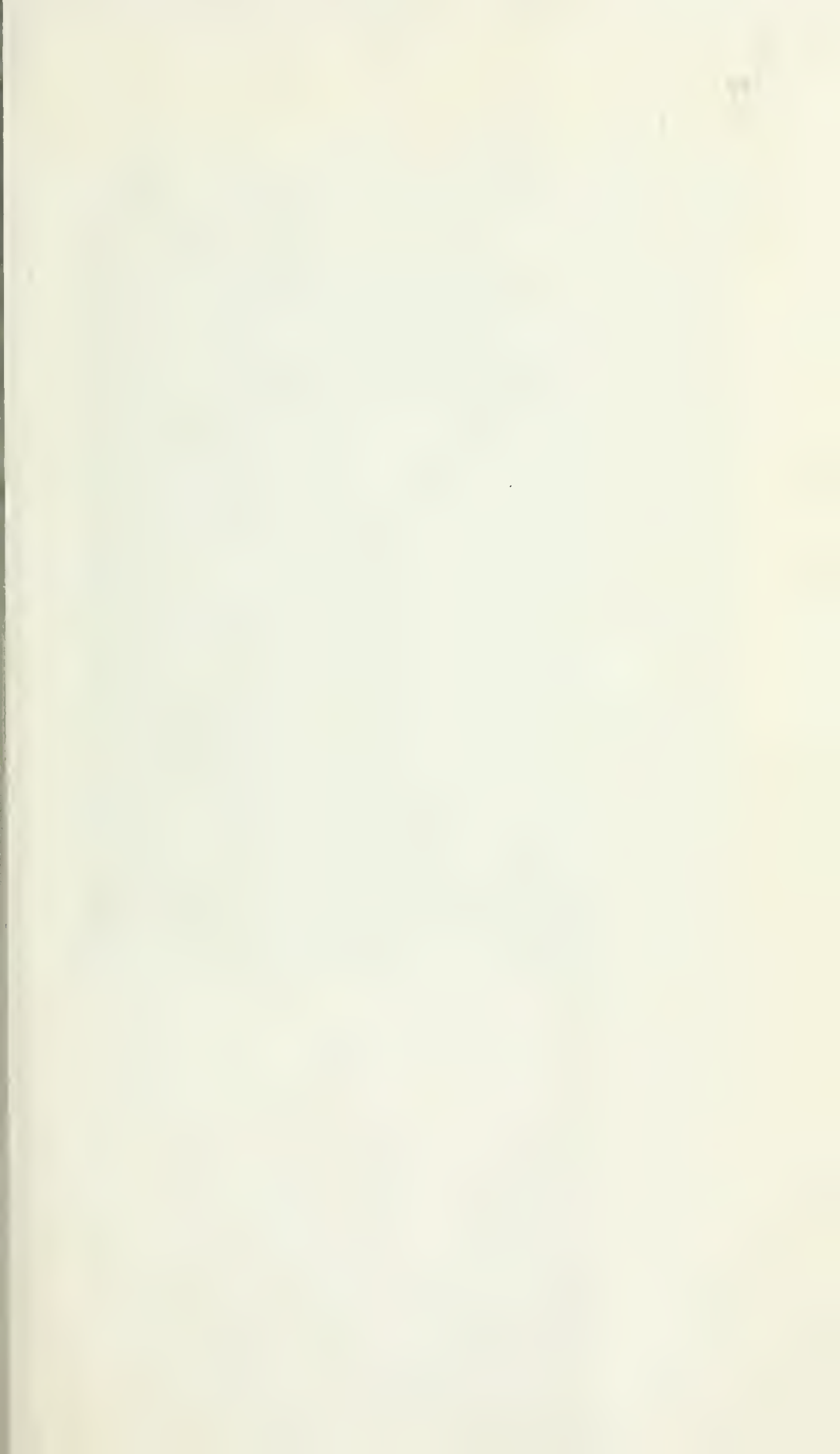




FIG. 8
Reproduced from a Gaslight Print
T. O'Connor Sloane, Jr.



FIG. 8a
Reproduced from a Pigment Print
T. O'Connor Sloane, Jr.



FIG. 0

Reproduced from a Pigment Print.
the negative being made with a soft-focus lens
T. O'Connor Sloane, Jr

The Photo-Miniature

A Magazine of Photographic Information

EDITED BY JOHN A. TENNANT

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Photography as a Craft

In the monograph which follows the reader is offered a lively and pointed consideration of certain principles in negative making and printing which, in practical application, give the photographic worker such complete control of these processes as to ensure his reaching the predetermined or desired end-result in the photograph. Here, obviously, we have something of vital interest to every intelligent photographer, whether he be an amateur, professional worker, or specialist. It is the end-result, the print, which spells success or failure in all our photography, whether we work for pleasure or profit. The ways and means to be employed in the application of the principles herein laid down are clearly set forth and illustrated as they have been demonstrated in the author's practice. There is nothing theoretical or problematical; the discussion is intensely practical, and affords a wealth of workable suggestion which can be turned to profitable use.

This explanation or summary of its practical content is placed here, at the very beginning, because the little book was written, not to display the individual methods of its author, but as a sort of protest against the present-day tendency to over-commercialize photography, and as a plea for its recognition as a craft. There is, of course, no intention to deny the great value of commercialized photography in the industries, or to decry the commercialization of methods and material where uniformity of product and quantity production

offer the best service. But there is an insistence upon the excellence of photography considered and followed as a craft, i. e., an occupation requiring special skill and dexterity or handiwork, wherein the personality and individuality of the worker count for more than mechanical method or efficiency. It is interesting to note in passing that those who follow photography in this way, as a craft wherein individuality and quality of product are opposed to quantity and machine production, grow in number year by year, and are receiving due recognition and reward. Among these craftsmen in photography, Mr. T. O'Connor Sloane, Jr., of New York City, who generously gives us here of his research and experience, has already achieved a notable success.—EDITOR.

Happy is the man who can make his living by a craft; he is not manufacturing in the modern sense, but is making something the excellence and value of which depends, to a very great extent, on his own personality and viewpoint.

The End-Result. Photography, as practised by the great majority of amateurs and professionals, is a mechanical process of near reproduction, and with this phase of the subject we are not now concerned. This monograph is based on the assumption that the camera can be used as a tool and not as a machine, and that the whole effort of the photographer is to attain a certain definite and foreseen end-result. In most cases this end-result will be very far from even an approximate rendition of the light intensities reflected from the object photographed. Such a true mechanical rendition of the light intensities of a colored object or set of objects will often give a completely inaccurate impression to the observer. Without at the moment going into orthochromatics, it is perfectly possible to place a green spot on a red background, the luminosity of each color being the same—a correct rendition in monochrome would be a grey spot on an identical background, whereas, physiologically, red is a brighter color than green. So let it be understood now and for all time that

what is wanted is not correct rendition of light values, but an end-result, a print reproducing what the photographer *sees* in the object photographed, altered in tone relation as he sees fit.

Know What You Want. Full directions for painting a picture can be given in a paragraph. Take a box of paints, some brushes, and, *knowing what you want*, apply the colors to canvas. The rest is practice.

The same holds true for photography. *Know what you want*. As in any art or craft, you must have a decorative sense, a feeling for form and spacing; more than in any other a grasp of tone relations and values. Without these it is no more easy to make a *picture* by photography than by any other method.

The Field of Discussion. Here we are going to keep within narrow limits and consider only the making of the negative and print at length, with a few words about the less important phases. The basis of everything is the negative; but it is only a basis. There is no such thing as a "good technical negative" *per se*. From our standpoint a negative is good only if it suits and aids in arriving at the final result desired, so that the making of the negative must first be taken up in perhaps somewhat tiring detail, and then most of the complexities eliminated for practical operation.

Equipment. Before this, however, mind one thing—simplicity—the fewest lenses, the fewest kinds of plates, the fewest chemicals; but plenty of trays and clean water. Photography is today to a great extent run by the man who has something to sell—so beware the advertisement. Any standard anastigmat will do, a *good* soft-focus lens; of which more hereafter, and, for some work, a Petzval portrait lens, will cover all requirements. Pick out your brand of plate by choosing the box you think will look best on your shelf; you will need a fast plate and a double-coated orthochromatic; these two will fill most needs. But, having picked your plate, stick to it.

Two developers are all that are needed: one of the soft or metol type, another of the ortol or even the hydrokinone type, working hard.

With this introduction, and assuming a knowledge on

the part of the reader of at least the simplest form of mechanical photography, namely push the button and use the tank, we will proceed.

Negative-Making. The negative image is composed of metallic silver reduced from the silver haloid in the emulsion by the developer; the more opaque the image the more silver has been reduced.

Some years ago Hurter and Driffield conducted a series of experiments on the scientific basis of negative-making, and certain of the results attained are of great value.

Definitions. At this point some definitions are needed.

Density: Amount of silver per unit area.

Opacity: Measured by the amount of light transmitted by any density.

Scale: Total range of opacities from darkest to lightest.

Ratio of Opacities: Relation of the opacity of each portion of a negative to the densest portion.

We will have to consider variations in opacities, scale, and ratio of opacities, density and ratio of densities. It may be mentioned in passing that the *density* varies with the logarithm of the opacity, so that a very small change in the density of any part of the negative will make a very great change in the opacity and printing power of that part.

Color as a Factor. Hurter and Driffield's investigations, while scientifically correct, are for our purpose entirely incomplete. Their work was done with monochromatic light, and takes no account of the effect of color on the observer or on the plate. In almost every case when they refer to "light intensities," they should have said "actinic light intensities." Shadows differ in color from the more brightly illuminated parts of the object, even though the actual color under even illumination be the same. The importance of this lies in the fact that color variations affect the photographic image entirely differently from their visual effect.

Where the different parts of an object are of different colors, the correctly exposed and developed plate, according to the H. & D. theories, may give an entirely erroneous impression of the luminosity (visual) of the

object, particularly when the effect of varying light intensities is superimposed on the actual color difference.

Scale and Opacity Ratios. In making a negative the first thing to be considered is the scale and opacity ratios desired, and when photographing a monochromatic object the problem is simple enough.

When color enters the difficulty increases. The same pair of colors may increase scale and opacity ratios under one set of conditions and in other circumstances may reduce the scale to almost zero.

Figure 1. To illustrate this particular point more forcibly, Fig. 1 has been made: a block was painted on two sides R—vermilion, B—ultramarine blue. To the eye, with both sides illuminated alike, the red side appeared much the brighter, and a correct monochromatic representation would have been medium grey for the blue and light grey for the red side.

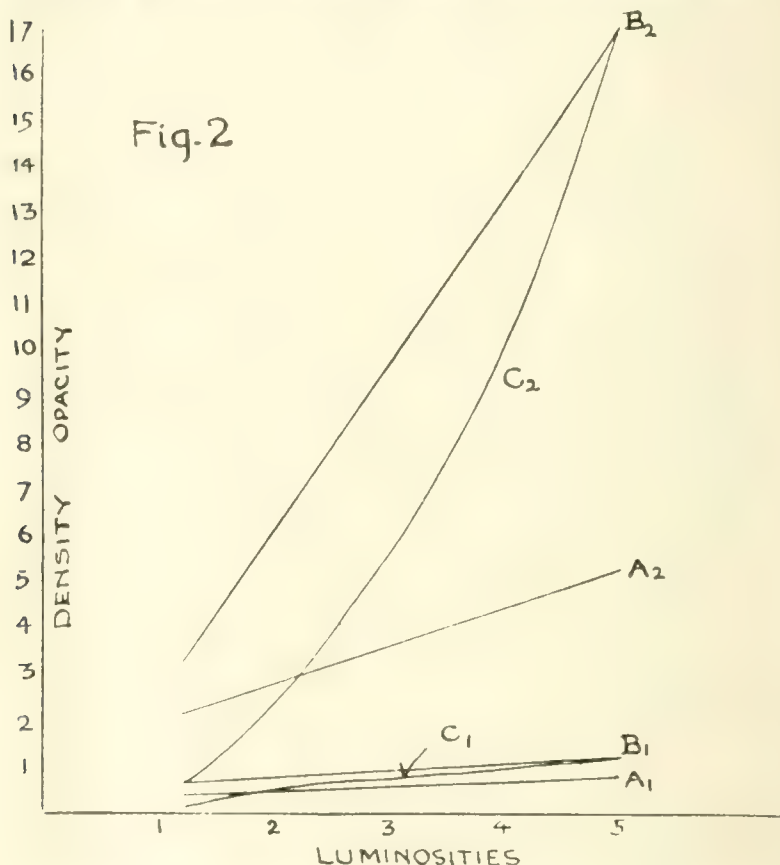
Two photographs, numbered as I and II in Fig. 1 were made: I with the red side of the block in light and the blue side in shadow, II with the block in the same position with respect to the light source, but with the blue side in light and the red side in shadow. It will be noticed that the print with the blue in shadow has a very low ratio, while the ratio is large when the red is in shadow. One curious point here is that I gives more nearly the usual effect of the object in the II position, and II that of the object in the I position than do the negatives of the respective positions.

The Criterion. With a firm grasp of the basic idea, that what we want in the finished print is a rendition of what we wish to record as we wish to record it, and with a realization of the possible effect of color on scale and opacity ratios—at present considered entirely apart from orthochromatic photography—the Hurter and Driffield method can be used, not as a means of obtaining scientifically correct luminosity ratios in negative opacities, but as a means of disturbing these ratios to aid in arriving at the desired end.

Opacity and Density Distinguished. There are three ranges of exposure: correct, under- and over-exposure. Correct exposure with correct development will give opacities which have the same relation to one another

as the amounts of actinic light reflected from the objects photographed. Long development will increase the opacities, the ratio of opacities, and lengthen the scale. Shorter development, still with the normal developer, will have the reverse effect. In each case the *density* ratio will remain the same.

Fig. 2 is plotted from Hurter and Driffeld, curves, A_1 and A_2 being density and opacity curves for 4



minutes' development, while B_1 and B_2 are the same curves for 8 minutes' development. In each case the object photographed had luminosities of 1.25, 2.50, and 5. Under-exposure has the effect of changing the *density* ratio in such manner that the opacity ratio alters, bringing the values for the halftones closer to

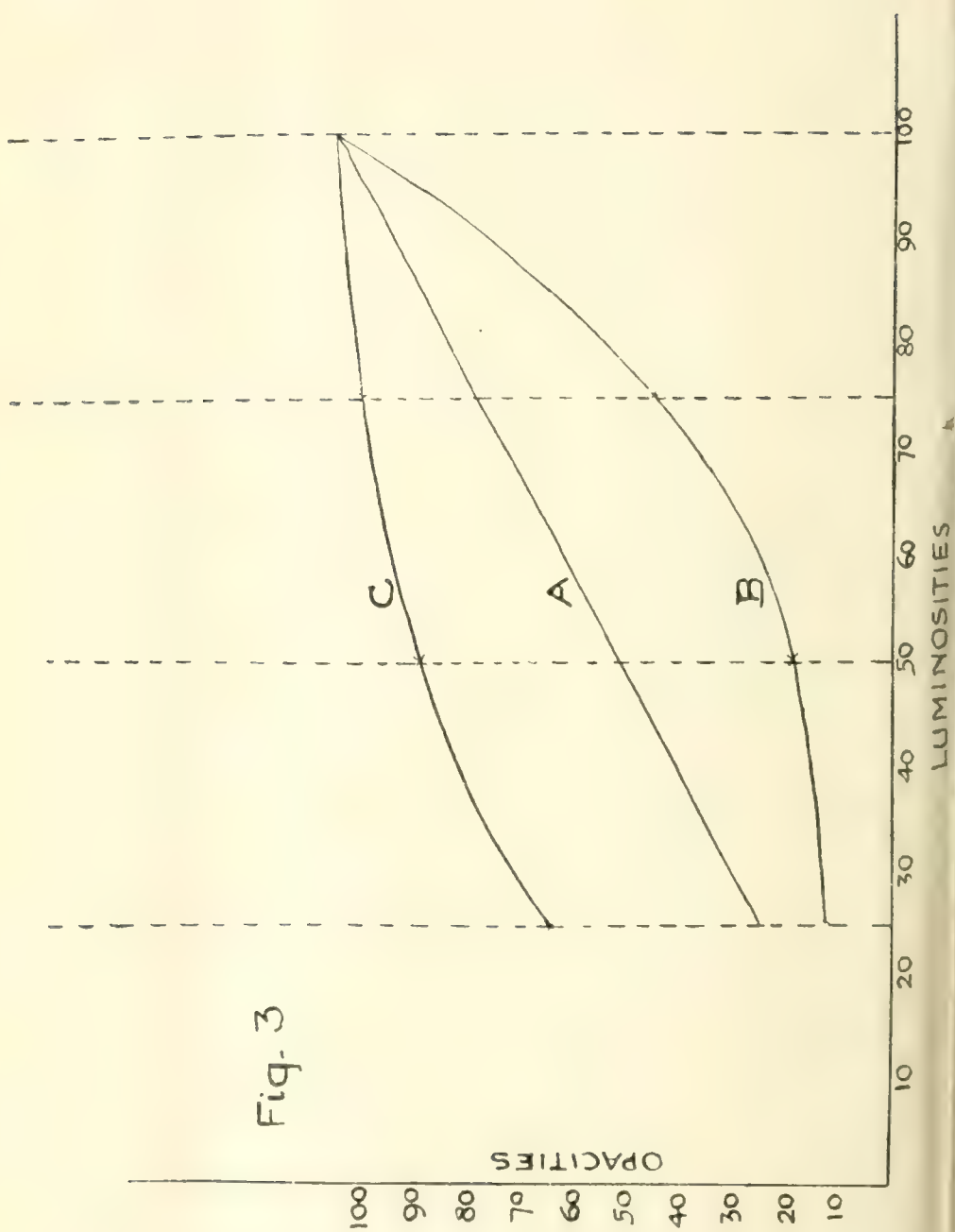
the values for the shadows, the result, if carried to extremes, giving what is known as the "soot and white-wash" negative. Over-exposure brings the opacities of the halftones closer to that of the highlights, giving an altered opacity ratio in the other direction and leading to "soft" negatives.

Basically, then, the opacity ratio for development carried to any given point is determined absolutely by the exposure. Varying the length of development varies the scale and the opacity ratio—it does not vary the density ratio.

Control. So far then, control consists in two factors: varying exposure to vary density ratio; varying time of development to vary scale and opacity ratio. These two elements can be varied in like or opposite directions. A long exposure with short development will yield a different negative from that given by short exposure and long development. An example in ordinary practice is the very high keyed print obtained when the exposure of the negative is extremely long and the development is carried to considerable density.

Result of Variation in Developer. Since the time of Hurter and Driffield's experiments, however, it has been found that there is a difference between the working of a normal and a very weak or very strong developer, particularly in the early stages of the process; so that, if with a certain exposure and normal development to a low scale, a certain opacity ratio will exist, if a *very weak* developer be used this ratio can be altered, apparently by the holding back of the chemical action in the most acted upon parts of the negative, due to the fact that there is so little reducer in the weak developing solution that it has to permeate and renew itself in the film before complete reduction can take place. The result is a reducing of the opacity ratio—a softening of the negative. Note that this alteration depends on checking the development early in the process and will lead to thin negatives. While at first consideration this effect may appear insignificant, we must remember that the *density* ratio is being altered, and that a very small change in this causes a considerable change in the opacity as shown in Fig. 2. There the reader will see plotted

Fig. 3



two curves C1 and C2, showing what would be the effect on opacity ratio of a slight change in density ratio.

Soft and Hard Working Developers. A very strong developer tends to reduce the silver in the most acted upon parts with increasing rapidity, and if checked in the early stages gives a thin negative with opacity ratios altered toward contrast.

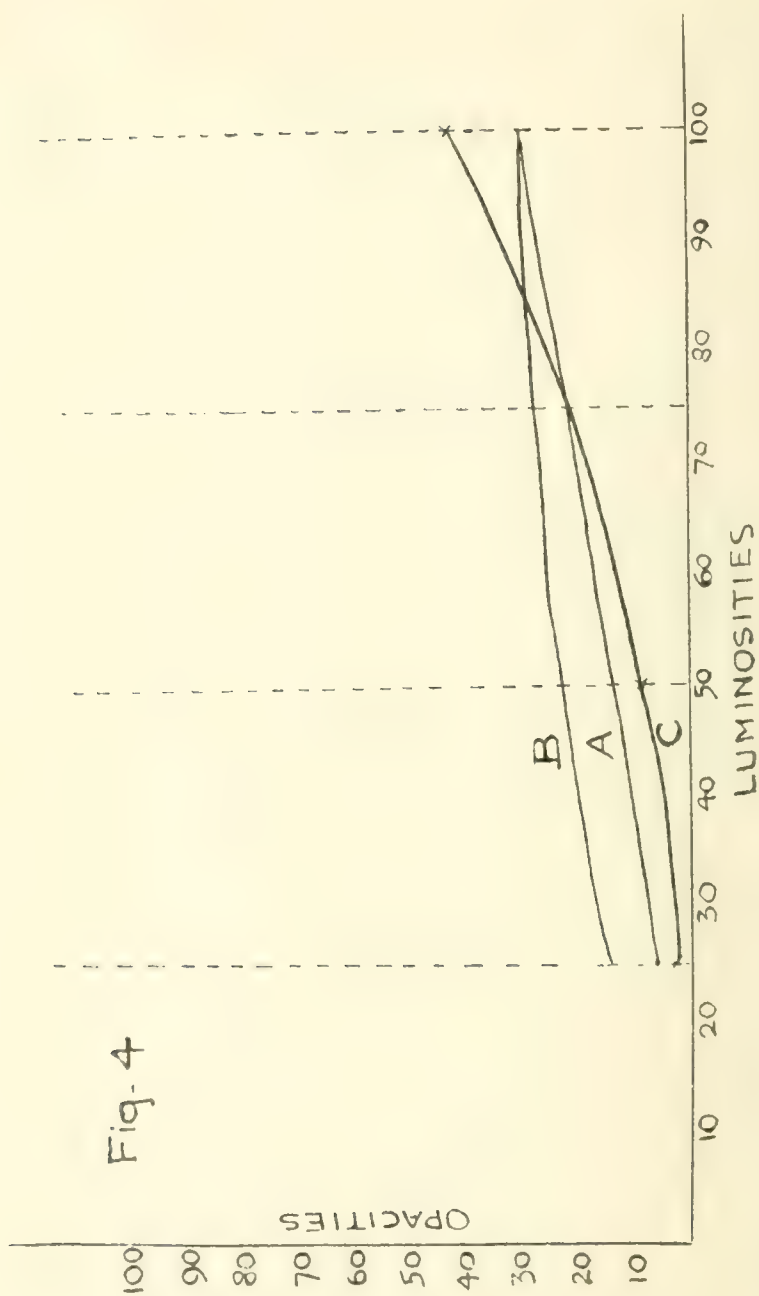
The effect of such a strong developing solution can be increased by using a "soft working" or "hard working" developer, the difference between the two, as far as we are here concerned, being that the first type brings out the deposits in the halftones and shadows almost as fast as the highlights in the early stages of development, later on in the process continuing to add density to the highlights until development is complete. The "hard" developer, on the other hand, rushes up the highlights and the halftones catch up later.

To Recapitulate. Control consists of three manipulation main factors: Exposure; Time of Development; Strength of Developer; the third being of importance only in the early stages, so that the attaining of the desired result depends on giving the correct exposure and checking the development at some point before completion.

Figure 3 shows *qualitatively* what results from under-, over- and correct-exposure with development carried to the identical opacity in the highest lights. The opacities are assumed to be for the correct exposure 10, 7.5, 5, 2.5, and are represented by the vertical lines erected at the points representing 25, 50, 75 and 100 intensities of actinic luminosities in the object photographed. A is the curve of correct exposure, B of under-exposure, and C of over-exposure. The opacity ratios for each case are shown in the figure.

Figure 4 shows with a given exposure, assumed to be correct, and development checked very early, the qualitative modifications due to strength of developer: A—normal, B—very weak, C—very strong, the last developed to identical density at the point of 75 luminosity. A set of opacities for each curve is given in the figure.

Correct Exposure. In the above discussion by correct



exposure is meant such an exposure that the *density* ratio in the negative is identical with the luminosity ratio of actinic light in the object photographed, when developed with normal developer. For the attainment of a desired result the "correct" exposure judged by H. & D. standards may be entirely incorrect.

Actinic Light. A brief discussion of what is here meant by the term actinic light may not be out of place. Photographically the light reflected from every point of an object is composed of two elements, that which affects the plate and that which does not, or but slightly. What the photographer is obliged to do is to use the actinic element to so affect his plate as to give a result approaching the visual effect of an object as he wants it recorded. From this difficulty arises the tremendous importance of color on the recorded scale of lights and shades, entirely apart from orthochromatic photography, and this seems to be a phase which has been more or less left out of consideration, i. e. the effect of color in rendition of light and shade.

Control consists then in the varying of the three factors before mentioned. With three independent variables in the equation it is easy to get lost in a maze of complexities, so that it is essential to pick out the few practical variations.

The Thin Negative. Without being dogmatic, the writer wishes to preach the gospel of the thin negative and the full exposure, not thin through under-exposure but through checked development. As a general rule it may be said that the exposure should run from a minimum which will barely give detail in the shadows to several times that amount. The upper limit depends on the color and luminosity of the highest light in the object photographed—it should not be carried to the point of reversal or fog. It results from this that an object without deep shadows or highlights has a much longer range of possible exposures than one in which the luminosity scale is long. Minimum exposure is determined by depth of shadow, maximum exposure by actinic luminosity of highest light in the object photographed. Depth of development depends solely on the opacity ratio desired and the type of subject photo-

graphed; and the ultimate opacity ratio is absolutely determined by the exposure.

A few empyric examples based on actual practice will be given, not as models to follow, but simply as indications of the author's practice and as a possible aid to the reader.

Typical Examples. First, consider a landscape of a very ordinary type: fairly light foreground, some trees and shadows, and a middle distance with a house, such a view that the exposure tables would indicate an exposure of 1-50th second. Using a 2-times color screen would call for actually about 1-20th second and the writer would give at least 1-10th second. Then develop in a strong developer of the ortol type to a low maximum density, the operation taking about 45 seconds. The result is a thin negative with a certain amount of snap to it. It will give a good, straight print on platinum or even that modern abomination, gaslight paper, and in addition has all the qualities needed for the ideal printing process, gum bichromate.

In portraiture the type of subject determines the type of negative to a great extent. To consider extremes, the young girl does not lend herself to the making of a strong negative accentuating her features and indicating a strength of character she does not possess. The opacity ratio should be shortened; expose very fully and develop slowly to the point where the scale is long enough to suit the printing process to be used. For the man with character written in every feature, we should preserve every variation of tone in each portion of the negative: there should be no smooth blending, so the exposure is reduced, a soft developer employed, weakened to a very great extent, and the process checked at an early stage. In this type of negative an evenly lit highlight will show infinite variation of tone values, due to the very small irregularities of surface, all of which could be ironed out by sufficiently long exposure and suitable development.

In studio work the question often comes up as to what length of exposure can be given without the subject moving and so ruining the negative. The writer's actual experience is that six to ten seconds can be given

without any bad results or the least irritation on the part of the sitter.

The principles of control have been laid down: to write more would be superfluous; applying these methods and practising for several years will enable the photographer to produce approximately the desired negative in perhaps three cases out of five.

The Scheme. At this point it may be well to lay out the matter already treated in the form of a scheme.

A. EXPOSURE.

- | | | |
|-------------------------|---|---|
| | { | Alters density ratio. |
| | | Halftones approach shadows. |
| 1. <i>Under</i> | | Tends to reduce total scale.
Opacity ratio dependent on length of development. |
| | { | Density ratios same as luminosity ratio in object. |
| | | Opacity ratio dependent on length of development. |
| 2. <i>Correct</i> | | Scale dependent on length of development. |
| | { | Alters density ratio. |
| | | Halftones approach highlights. |
| 3. <i>Over</i> | | Tends to reduce total scale.
Opacity ratio alters with length of development. |

In each case there is a whole range of exposures coming within each classification.

B. DEVELOPMENT (Normal developer).

- | | | |
|-----------------------------|---|--|
| | { | Negative thin. |
| | | Scale shortened. |
| 1. <i>Short development</i> | | Opacity ratio shortened.
Density ratio unchanged—is as determined by exposure. |
| | { | Negative dense. |
| | | Scale lengthened. |
| 2. <i>Long development</i> | | Opacity ratio lengthened.
Density ratio unchanged—is as determined by exposure. |

C. DEVELOPMENT (Strength of Developer).

Of value only when development is checked early.

- | | | |
|---------------------------------|---|---|
| 1. <i>Very weak</i> | { | Density ratio shortened by holding back highlights. |
| | | Opacity ratio shortened. |
| 2. <i>Very strong</i> | { | Density ratio lengthened. |
| | | Opacity ratio lengthened. |

Type of negative is determined by character of subject, end-result desired, color of subject, relative actinism of lights and shadows, and printing process to be used.

Scale. Knowing the general type of result that is desired, the *kind* of negative best suited can be obtained. There is, however, one element which is determined almost entirely by the printing process to be used, namely the *scale* of opacities. This is, of course, dependent, in a sufficiently exposed negative, on depth of development, so that, having determined your basic density ratios by kind of subject, color, actinic luminosity ratio, etc., the actual point to which development should be carried is to a very great extent dependent on the printing process, always bearing in mind that when development is carried to a fairly heavy density, the slight control over density ratios due to modifications in the strength of the developing solution is lost.

The writer is a strong believer in the thin negative, so thin that if looked at against a blue sky the image except in the very highest lights, is almost invisible. This subject will be taken up more fully under printing.

Demonstration. By the person anxious to work, a tremendous amount of practical knowledge can be acquired in a comparatively short time by following out a scheme somewhat as follows:

Take the whitest plaster statuette that is made, with plenty of folds and drapery, place it against a black velvet background, light it very strongly on one side, and make one or two hundred negatives, bringing in all the changes of exposure and development made possible by the scheme laid down in earlier pages, and see how the scale and opacity ratios can be altered. Change the background, putting up one of light grey, and notice by a repetition of negative making that with

the same exposure and development the values are all *apparently* shifted. Remember that in a picture the only things that count are appearances.

After this take an object such as a statuette colored in reds, greens, and blues; with this can be studied the effect of color on the rendition of light and shade, as well as its influence on opacity ratios. This is of great importance and, at the risk of repetition, it must be emphasized that this phase of color study has nothing at all to do with orthochromatics. If it be objected that this suggestion involves considerable time and labor, let the reader remind himself that Albrecht Durer spent two years in making detail sketches before he began to paint the Heller altarpiece.

Lenses. Some consideration should here be given to lenses and plates.

The Anastigmat of any given aperture and focal length will give a defined image between two planes of distance, a *defined image* being considered as one in which the projection of a point does not exceed 1-100th of an inch in diameter. The larger the aperture and the greater the focal length, the shorter is the "depth of focus" or range of the field of definition lying between the two planes of distance mentioned. Where a sharp, evenly defined image is desired, the anastigmat should be used. However, remember that an out-of-focus negative made with an anastigmat is an abomination.

The Petzval Portrait Lens has, as the aperture is large, slight depth of focus, and as its field is spherical, if the focusing be done on the center of a plane diagram, the edges of the image will not be defined. For certain kinds of portrait work, particularly large heads, this lens is admirably suited, giving crystalline definition to the principal object.

The Soft-focus Lens is the most abused and retaliatory instrument in the field of photography. Its use will never aid a man without the craftsman's sense to produce good work; its misuse can ruin anyone.

The original soft-focus lens of the present type, as far as the writer knows, was a single combination, partially achromatic lens, introduced by Smith, later the Pinkham & Smith Co., of Boston. In the use of

such a lens the blue and more actinic rays come to a focus at a point farther from the lens than the red or more visible rays. The consequence is that, focused by the more visible rays, there is a greater or less dispersion of the more actinic chemical rays, giving the effect of a halo about the dividing-line between lights and shadows, and in the surface of the highlights. This can be reduced by focusing on a highlight, and then racking back for a distance which can be ascertained by experiment, or by focusing on a portion of the object with predominating cold tones as in the shadows. Try focusing the identical object, holding first a piece of blue glass and then a piece of yellow glass, held between eye and ground-glass, noticing the difference in the resulting negatives. Individual lenses of this type differ much; some are too incorrect (or not sufficiently corrected for practical purposes) and require **stopping down or very careful focusing.**

Figure 9. The result obtained by a proper use of the lens is a separation of planes of light and shade, and a subduing of detail without loss of necessary definition. Fig. 9 shows the effect of this separation of planes, giving a pleasing roundness of projection with satisfactory definition in near and distant portions of the object. The misuse of the soft-focus lens results in a print which **makes one dizzy to look at.**

There are certain photographic qualities which are intrinsically good; others which are intrinsically bad. The soft-focus lens, a misnomer by the way, can add nothing, but can aid in the elimination of the bad qualities. The trouble is that most of them do introduce a set of bad qualities distinctly their own, i. e., due to inherent constructional or correctional defects.

Focal Length. The longer the focal length of a lens, the better the perspective, so use the greatest focal length permitted by the circumstances. Do not purchase on a basis of covering power. A good general rule is to use a lens with a focal length more than **double the short diameter of the plate.**

Plates. Makes of plates differ in action, but once understood will give about equally good results, therefore the advice in the beginning to stick to one brand of

plate. Fast plates are needed, and very fast plates are not orthochromatic, but they do usually work with a lower density ratio than slow plates, so that, for portraits, comparatively long exposures and well-judged development will yield a negative suiting the subject.

For every possible sort of work where speed is not essential, the double-coated orthochromatic plate is the best plate. It will stand great increase in exposure without reversal, is more sensitive to changes in the strength of the developer than the ordinary plate in the earlier stages, and of course has the power of giving a much longer scale if desired.

Visual and Luminosity Contrasts. The subject of orthochromatics is one on which a considerable sized volume might be written. Visual contrasts, in an evenly lighted subject, are to a great extent due to color variations, and may be very different from actual luminosity contrasts. The color of a shadow differs from the color of a highlight, consequently the photographic image, being very dependent on color, as it is formed by the action of actinic light, may, and usually does, give a totally wrong effect of color suggestion in the finished monochrome record or print.

Filters. For outdoor work a color-screen is almost essential, i. e., a screen which simply reduces or subdues the action of the most actinic rays. A heavy screen usually leads to disagreeable effects. Thus, a screen increasing the normal exposure twice, and used, in practice, as a fourtimes screen, often gives a very pleasing effect in the print. For portrait work, a screen is rarely needed, the double-coated plate with a proper exposure and suitable development, giving the photographer the sort of negative he wants.

Choice of End-Result. Up to this point only the technics or mechanics of photography have been considered. Before touching on printing there must be taken up the most difficult part of the subject, not only to learn but to write about, namely, the making of the decision as to what is to be accentuated or suppressed, what scale of contrast is to be used, and whether the print is to be made on a straight or commercial paper,

or by a process in which the photographer has complete control in manipulation and result.

Decorative Quality. First of all, in this consideration, the value of a picture to the onlooker is, omitting any value due to the interest of the subject, due to its decorative qualities, a combination or arrangement of tones and form which gives an abstract pleasure. If the photographer has not by nature a decorative sense he had better leave the craft of photography alone.

As a sort of example one may consider two portraits of the same subject, equally correct as to likeness, alike in dress and mechanical technique—one is better than the other, not as a portrait but as a picture. Why? The answer is decorative quality.

Cultivating the Decorative Sense. Study good pictures: the Byzantines, Italian paintings, Japanese prints, Tanagra figures, and, to mention one man in particular, El Greco. Read Clive Bell on "Art" several times and learn to SEE. Discarding superfluities, what is there in a particular landscape that pleases? Remember to strip away the color, leaving only detail and form; still further simplify, reject detail and come to the actual tone values and mass arrangement. Having done this, accentuate and suppress, by choice of lens, exposure, developer, development and printing. If the original conception was correct, the end-result, the print, will be worth while.

It may occur to some as an absurdity that the study of the masters of art should be an important part of a photographer's education, but what is therein to be learned is so very basic that it runs through all art from the lowest to the highest. Art does not exist without it, and the best place to study anything is where it is best practised.

The Test of the pudding is in the eating thereof, and the test of the photograph is the print, hung where you have to see it several times a day. Almost anything looks good for a few minutes—novelty always pleases. A fish may taste very good, but result in ptomaine poisoning.

Printing Processes. There are two types of printing processes: those in which the image is formed by chemi-

cal deposit, and those in which it is formed of a pigment. Between the two there is no comparison, with the single exception of the platinum print, and possibly an occasional bromide print.

The pigment print is in a class by itself. There is in general a surface quality which is pleasing or displeasing. Properly applied pigment has a pleasing quality; chemical deposits have not, again with the exception of platinum, which, with its deposit of platinum black almost partakes of pigmental quality. All things look alike in the dark. A pigment print and a silver print in subdued light may have much in common, but in the glare of a bright light the silver print will be a weak and frail thing, while the pigment print loses little or nothing of its quality.

Look out for surfaces; there are several mechanically made surface qualities in manufactured papers which bear the same relation to natural variations that a pressed concrete block does to real stone.

We will consider briefly two processes of so-called "straight" printing:

The Bromide Print reproduces very nearly in the form of light and shade the opacities of the negative. It is capable of giving a very good black in the deep shadows without masking the detail and is simple in manipulation. The photographer must here get what he wants in the negative. Somewhat different results are given by different papers, and here, as is usually the case, the English worker has a much wider field of choice than the American. Our manufacturers will only make that for which there is a large sale; their attitude is that if you don't want what they make they can do without your business.

A fairly weak developer of the ortol, metol-hydro, or amidol type will give good results with bromide paper, varying slightly in color. The exposure must be about right—of course directions for this cannot be given—and the development ought not to be forced. The negative needs to have a fairly long scale as a weak chemical deposit accentuates its own bad qualities.

The details of bromide printing have so often been treated at length elsewhere that it is not necessary to

repeat them here, except to utter a word of caution. Bromide prints can be toned, but unless done by the hypo-alum process, carried forward only slightly, the resulting colors are intrinsically bad—so don't.

The Platinum Printing Method is the king of ordinary printing processes. It will give a rich print from a thin negative, so that it lends itself to control in negative development. It is expensive; at the time of writing, metallic platinum is worth, or rather costs, from \$125 up per ounce; but it is worth the difference. Increased depth of printing gives a longer scale in the print and the rich shadows that are so pleasing.

By adding a *very small* amount of mercuric chloride to the developer, and using it hot, the color of the print can be made a warm black; by adding more of the mercury salt a rather unpleasant brown tone can be obtained, which, however, is not permanent. The black platinum print—provided that the black deposit is actually pure platinum—is absolutely permanent.

At considerable cost platinum paper can be made as needed, and its natural scale of contrast altered to meet individual requirements. The writer has used the formulas given by Miss Stanbery in **THE PHOTO-MINIATURE** No. 96 with complete success. Evenness of coating or otherwise does not make much difference, but rapidity of drying does. It is a lot of bother to size the paper so that the coating will not sink in, but good papers may be had which do not need sizing. For example, any of the good Japanese vellum papers, Whatman drawing-papers and, perhaps, best of all, the so-called French Vellum papers, can be used.

In using Willis & Clements' platinum paper, a strong hot solution of neutral potassium oxalate gives an agreeable color; their sepia paper may be developed in the same bath, this giving a rather warm black color with low contrasts.

Sometimes a dead surface print may be aided by roughing. One way of doing this is, when the print is moist, to lay it on a sheet of lintless blotter in a letter-press, cover the face of the print with a more or less rough cloth, and squeeze hard, letting it dry under pressure. The surface effect so gained is permanent.

The Pigment or "Gum" Print. Finally, we come to a consideration of the pigment print. There have been many pigment processes devised: carbon, oil, bromoil, Artigue, gum-bichromate (sometimes politely called photo-aquatint), and their modifications. One good process is enough to build upon, so the easy, inexpensive, and much-abused gum-bichromate method of printing will be the only one considered.

Its Flexibility. In negative-making the voluntary alteration of opacity ratios is confined within comparatively narrow limits, and the straight print is in every case a nearly mechanical reproduction in monochrome of the negative opacities. To hold complete control to the end of the story, it is necessary to use an entirely flexible printing method which has no other rules than the will of the photographer, one in which the luminosity ratios can be altered at will, in which one set of tones can be modified without affecting others, and where mass relations can be altered by suppression or accentuation of certain elements. These things can all be done in gum-bichromate, and it is owing to this flexibility that, in the hands of the tyro, the method leads to such undesirable results.

Character of Image. There is a general feeling that this process is only adapted to broad effects and gives a somewhat woolly, loose-grained image. This is entirely a misconception, as a smooth print with complete gradation is just as easy to make as one of the other sort. Compare Figs. 7 and 9 among the illustrations of this issue. The photographer has at his disposal the whole range of color. He can build up or suppress the contrast scale at will.

The working directions for gum-bichromate printing are simple, but the making of satisfactory prints is a matter of much practice and foreknowledge of what will be the result of any operation undertaken.

The Coating-Mixture. It is much easier to build up than to suppress contrast, hence start with a thin negative free from fog.

There are three elements in the coating-mixture employed: gum solution, 10 per cent potassium bichromate solution, and pigment.

The gum solution should not be weaker than two ounces of the best gum arabic tears that can be bought, in five ounces of water. Strain the solution through a handkerchief and keep dust from getting in it. Use good colors: Winsor & Newton's water-colors, in tubes, are the writer's preference; red chalk can be ground up in a small mortar and is first class. Cheap colors do not pay.

Variation. Coating-mixtures can be infinitely varied at will, but a sort of standard formula may be given. For example: Put 2 drams of gum solution into a small mortar, add 4 drams of bichromate solution, with enough color to give you the effect desired in the print, and grind all together for about 30 seconds. There is a certain maximum of color that must not be exceeded, otherwise the whites of the print will be permanently stained. In the mixture above given about three-quarters of an inch of color squeezed from its tube will do; if you use powdered red chalk take from 12 to 15 grains.

Manipulation. The paper to be coated is pinned flat to a board, and a thin, even coating of the mixture laid on with $1\frac{1}{2}$ -inch wide bears'-hair brush. This coating is smoothed over by a few strokes with a 4- or 5-inch flat badger's-hair brush and the paper is hung up to dry.

The amount of mixture above given will coat four or five 9 x 11-inch sheets of paper, which can be cut down to 8 x 10 inches by trimming off the irregularly coated edges. Rub the coating-mixture in well and dry rapidly by pinning the sheets up over a radiator or other source of moderate, dry heat.

Printing and Development. Print with any convenient form of print meter for about half as long again as would be needed for printing-out paper. Immerse the print in *cold* water until saturated, then float it, face down, on the surface and leave it alone. It will be developed in from half an hour to forty-eight hours. Development can be considered as complete when the drippings from the corner of the print, when held up, are clear of color. Change the water after the first few minutes, and have it cold. If the print is under-printed

and hung up when the color can run, the halftones will run over the highlights, causing stains. This is the simplest form of gum-printing. The modifications are legion.

Modifications. Taking up those which are independent of mechanical aid, the first is in the amount of color. The maximum amount that can be carried without staining depends on four factors: the paper used; actual weight of dry gum; proportionate strength of gum in the mixture; and rapidity of drying.

Any good charcoal paper, Arnold's unbleached of either surface, toned detail paper, are all good and will stand plenty of pigment.

Amount of Pigment. In a solution of given strength, so much gum will carry so much pigment. Thicken the solution by decreasing water in the original gum solution or using less bichromate solution and more pigment will be needed to cause staining—but it is safer to keep well below the staining point. Less pigment will decrease the contrast scale; more will increase it. This is obvious.

Printing can be carried to a point where most of the gum is rendered insoluble and will not dissolve, or it can be checked so that above any given point in the scale you will get white paper in the print. Too heavy a load of pigment, even if it does not cause stain, will have a tendency to give granularity in the highlights. Printing in the shade also gives a more granular print than when the printing is done in full sunlight.

The Scale can be modified by the color used—a grey has a shorter scale than black, as its maximum depth is that of the color itself.

Multiple Printing. The next degree of control is through successive or multiple printing. In this method first adjust the negative by any of the well-known ways to secure registration in the several printings. Now if the first print be made giving the desired depth of color in the highest light, the print then developed and dried, it can be again coated with a similar mixture as used for the first printing and exposed for a shorter time, when the second development will give a print wherein the highlights and lighter halftones are un-

affected, but with the shadows and heavier tones increased in depth. This means increasing total contrast, and, what is even more important, increasing the ratio of the lower tones, below a certain depth, to those above them.

Each of these two printings can be carried to any point desired, and even a third printing can be made. The scale of a thin negative can be built up so that the print runs from white paper to heavy black. By this means every tone from a predetermined depth to the deepest may be varied, and by simple mechanical manipulation, certain chosen tones near the center of the scale can be varied almost at will.

Variation in Pigmentation. The next modification is the use of different amounts of the same pigment in successive printings. If the first printing be done with but half the usual amount of pigment, and be printed for the highlights, and the second print, carrying the full amount of color, be exposed for the shadows, the resulting print will be very marked in the differentiation between the lighter and the heavier tones. It is actually an increase in the scale, but it is of a peculiar kind, and might be said to result in a print with two separate scales of luminosities, one for the light tones and one for the heavy tones. The result is usually brilliant. A further modification is to make the first print with a heavy pigmentation and the second with a weakly pigmented coating.

Only the merest indication of these things can be given, as they must be made a matter of experiment by the photographer.

Figures 5 and 6. Among the illustrations two prints are shown from the same negative, Figs. 5 and 6, the first a platinum print, and the second a multiple gum in which the scale has been much extended.

The Use of Color. Different colors may be used in successive coatings, but this is a tricky proceeding and very limited in its uses. The use of a warm color for the whole print in the first printing, with a second printing in a colder shade for the shadows only, is the kind of two-color work which is safe. Note that as the color of the second printing is always affected by

the one underneath, the result is not always what is expected.

Mechanical Variation. The second set of variations depends on mechanical treatment. If a print be made of such depth that it will only develop with great slowness by floating, a stream flowing over its surface will bring it out. If a still deeper print be made, it can be washed over with a brush, either locally or in its entirety. Where the printing has been carried still further, a print will be obtained which can be brought out only by washing or scrubbing the whole print with a fairly stiff brush.

Figure 7 shows a heavy, single-coating print printed so deeply that the higher tones could not be developed by soaking. The whole print was therefore developed by plain, straight brushing, the accents being put in by means of brush and atomizer.

In **Figs. 8 and 8a** we can compare a straight gaslight print from a thin negative, and a heavy, single-coated gum print from the same negative, the background in this latter print being developed by spraying with an atomizer. In this work the print is first laid down on a glass plate and stood up vertically while the spraying is done. It is understood that in every case the print must be well soaked before starting operations of this kind, and the printing must be thorough. This sort of treatment, of course, always breaks up the surface of the pigment coating and makes it more or less grainy.

If a first print be made quite heavy in pigment, then brush developed, and a second print be made on top, a new set of results is possible. A case in point is that of a straight gum print which showed too much shadow under the eyes and cheek-bones. A first print was made, brush-developed all over, then the shadows before mentioned were almost eliminated. The second print was made with a mixture carrying but little color, and the modeling wiped out in the first print replaced in a higher key in the second.

Where the subject is a landscape, with some feature in the middle distance which should be accented, a first printing can be brush-developed, most of the print being eliminated in this process, and then the second print made and developed by floating.

It will be seen from this brief recital of experiments that the possibilities of variation and control are endless.

Character of Surface Texture. A usual criticism of the gum process is due to the rough texture of the print surface. In an unmanipulated print, even with a heavy color content, there is no reason for not having a smooth, unbroken surface, in fact the writer is at a loss to know what causes such graininess. Figure 9 is reproduced from an 8 x 10 print simply to show that a gum print will be smooth and free from woolliness or grain if left alone. This print is a single-coated gum from a thin negative developed by floating. Playing with a gum print while it is developing nearly always leads to trouble. Incidentally, this portrait also shows that the soft-focus lens, in this instance a Smith Semi-Achromatic, will give all the sharpness desirable, even in a large head made with the lens at full aperture.

Flexibility of Technique. The gum process is so entirely flexible that one can only give the results of experience. What is one man's meat is another man's poison, and the writer knows by sad experience that following other people's methods often leads to catastrophe. Nevertheless, using the few hints given here may provide a point of departure, from which the reader can build up a technique of his own. No printing process is really good or "worth while" which cannot be mastered, and no "straight" printing can be mastered, simply recording mechanically what is there to be recorded within the narrowest limits of forced variations. The gum process simple though it is, must be driven where the photographer wants it to go—and therein lies its great value. It can be made a medium of personal expression, and, combined with a thorough knowledge of the technique of negative-making as a means to an end, varied and controlled in innumerable ways until the end-result desired is attained. No other process is there which has such great simplicity, and will, at the same time, respond so completely to the photographer's will.

Range of Tones. It has been said that gum is a "short-scale" medium, that a long scale cannot be had

at one printing, and that if it be printed for the high-lights, the shadows will be blocked and without detail. This has not been the writer's luck. On the contrary, with a proper negative, a full range of tones from white to black can be had at a single printing, and the object of the multiple printing methods described herein is to build up or down and otherwise alter the scale of the negative where this is desired.

Gum-Platinum. There is a combination process, gum-platinum, which has beauties of its own. If a platinum print first be made which gives the rendering of the lights and halftones desired, the shadows may be strengthened and vigor, with variations in tone values, given by making a careful registration, coating with gum mixture, and printing to a point which will give the increased depth desired below any given point in the scale.

The gum coating for this purpose should be smooth, and the print very carefully handled when wet, as the wet coating is exceedingly sensitive to mechanical injury, and a very smooth pigmentation is desirable in the finished print.

Sizing Paper. A question which very frequently comes up in gum and gum-platinum printing is that of the sizing of the paper. There are plenty of papers made which do not require sizing, even for multiple printing, and it is easier to find such a paper and stick to it than to bother with the sizing of odd papers. Queer paper never made an artist. Another point on size and sizing is that some papers seem to repel the coating. These had best be left alone.

Questionable Helps. We can now consider a number of more or less meretricious aids in photography, the object of which, in the last analysis, is the alteration of scale and tone ratios. These aids consist of negative stain, intensifiers, reducers, and the like.

Negative Stain is caused by using a developer, such as pyro, which will give it; the whole negative is of a yellow color, particularly noticeable in the shadows. This stain is supposed to give "printing quality" in a thin negative—it does tend to hardness and for gum printing is very harmful.

Intensifying increases the opacity ratios of the negative, giving a longer scale. If a single solution intensifier is used, local intensification is a very simple proceeding. If it is desired to intensify the face in a portrait, the negative is dried and the intensifier applied to the face only with a soft brush. This is quite successful where the background of the portrait is almost clear glass in the negative, since this is not affected to any appreciable extent by any of the intensifier which may get past the edge of the face, otherwise it is almost impossible.

Of Reducers, there are two kinds: that generally called Farmer's reducer, and ammonium persulphate. The first type acts on the fainter densities of the negative at least as rapidly as in the heavier, so that if the operation be carried to extremes, the lower densities will be reduced to clear glass, while the heavier parts of the negative will have fair density. The result is similar to that obtained by under-exposure.

The ammonium persulphate reducer, on the other hand, attacks the denser parts of the negative with the greatest rapidity, thus causing a shortening of the density and opacity ratios and a shortening of the scale. The general result is similar to that produced by over-exposure and, if carelessly used, this reducer will lead to undesirable flatness.

Enlarging Negatives. It is often convenient, especially in landscape work, to use a small camera, the resulting negative being afterward enlarged to any desired size. In the making of this enlarged negative, which is merely the photographing of a transparent positive by ordinary means in a special camera, everything that has been said of negative control applies with equal force; in fact, to a magnified extent, since scale and ratios may be changed or modified in the making of the transparency as well as in producing the enlarged negative.

The Simplest Procedure is to make the transparency or positive by contact with the original negative in a printing-frame, taking the most scrupulous care to have no dust between the negative and the transparency plate. For most purposes I prefer a double-

coated plate in this method, as yielding the most satisfactory results, though if a very brilliant enlarged negative is desired a regular transparency plate may be used.

The Scale and Opacity Ratios in the positive or transparency depend on exactly the same factors as in an original negative, therefore govern your exposure and development according to the result desired, although it may be given as a general rule to keep the positive soft and rather dense. This is owing to the fact that enlarged negatives made from thin positives have a tendency to be disagreeably harsh.

The Exposure and Development of the final (enlarged) negative call for good judgment in order to ensure the desired result. By this enlarging from a small negative to the desired size, effects can be obtained which are not possible either by direct photography or by enlarging from a small negative onto paper. The reason is obvious: as often stated, one of the main elements which interfere with complete control is the color of the object photographed, and in photographing a negative this disturbing factor is entirely absent.

Practical Classifications. All of that sort of photography which we are here considering can be divided into two major classes, requiring different technical handling. The first includes portraits and figures, whether indoors or out-of-doors, where the head or figure as the case may be is the one and only important feature of the photograph, all else being background. The second class includes landscapes, views, landscapes with incidental figures, and the so-called "genre" pictures, where these last are not carefully made up studio counterfeits.

Over objects falling in the second class there is but one form of control, that of selection, both as to position, elimination and illumination; the rest is technique as it is here understood.

Control in Portraiture. When, however, the first division is considered, then there is the placing, draping and lighting—all at the control of the photographer, and a mistake in any one will ruin the best conception. At present much attention is being given to the lighting

of heads and figures, with results surprising and marvelous to behold. Artificial lights are placed at odd points, picking out and shining on different parts of the head or dress, and giving effects certainly never seen outside of a photographic studio or a stoke-hole. These results are novel, and, for the moment, pleasing, but, to venture a prophecy, it would seem as though in the course of time they will be relegated to the limbo of puffed sleeves and imitation rustic furniture as an aid in portraiture. These others were thought beautiful in their time. In the larger sense nothing is beautiful unless it remains so permanently, consequently it would seem the part of wisdom to stick to the utmost simplicity in lighting, unless the masses of light and shade in the subject lead directly to decorative spacing and mass relations.

A study of the greatest portrait painters will show very little trick lighting. Holbein's drawings are wonderful—and simple. Why is it necessary to discard the experience of the centuries when the camera is the tool?

A Test. A rather good test of the excellence of the portrait of a charming woman is to imagine the homeliest conceivable woman in place of the real subject. If the picture is pleasing in spite of its subject, it is rather liable to be good in the abstract sense.

Subject interest and pictorial interest are absolutely independent, and many a poor picture is hung in our museums, mistaken for art, because of the quality of its representation.

A teacher of art once remarked to his students that he knew of no class of people so devoid of good taste as artists. There seems to be a general idea that the mechanical ability to lay paint on a canvas carries with it good taste. Is there any reason why it should?

Summing Up. To anyone who has read what precedes this, the object of the monograph must be fairly clear. There has been no attempt at a compilation of formulas, or at a course of instruction, but merely a more or less analytic study of how and in what manner well-known processes can be bent to the will of the photographer. No unyielding medium can be used other than in a mechanical way, consequently the short consideration

that has been given to printing processes which, on account of their narrow limits of variation, can only give good and satisfactory results if the negative contains all that is desired and no more.

The craftsman and the artist do not depend on quantity production for their reward, so why should he who wishes to practise photography as a means of individual expression? The curse of photography is the ease with which it can be turned into a mechanical proceeding, in which the operator bears the same relation to the finished product that the boy who feeds steel bars into an automatic screw machine does to the screws resulting from the brain activity of the man who designed the machine.

The surface of the possibilities of photography as a craft have hardly been scratched; incessant work and study are the only roads that lead to success and the power to impress the individuality of the photographer on his finished product.

T. O'CONOR SLOANE, JR.

BOOKS

ART. A Theory of Visual Art. By Clive Bell. London: Chatto & Windus. 1915.

COMPOSITION. A Series of Exercises in Art Structure for the Use of Students and Teachers. By Arthur Wesley Dow. 9th edition. Revised and Enlarged. 1918. 128 pages, profusely illustrated with line and half-tone engravings and color plates. 9 x 11. Paperboards, \$5.

PICTORIAL COMPOSITION AND THE CRITICAL JUDGMENT OF PICTURES. A Handbook for Students and Lovers of Art. By Henry R. Poore. 11th edition. Revised. 280 pages. Profusely illustrated. Cloth, \$2.75.

ART PRINCIPLES. With Special Reference to Painting; Together with Notes on the Illusions Produced by the Painter. By Ernest Govett. 378 pages; 31 illustrations from the Masters. 1919. Cloth, \$3.50.

ESSAYS ON ART. The Education of the Eye. Practical Hints on Composition. Light and Shade. By John Burnet. 1882. Republished 1913. Fully illustrated in line and half-tone. Cloth, \$1.50.

Notes and Comment

ONE-MAN EXHIBITIONS. The Camera Club of the Boston Y. M. C. A. has arranged a series of one man exhibitions for 1919-1920 as follows: October—Louis Fleckenstein, Los Angeles, Calif.; November—John Wallace Gillies, New York City; December—Miss Margrethe Mather, Los Angeles, Calif; January—Frederick F. Frittita, Baltimore, Md.; February—Ford Sterling, Los Angeles, Calif.; March—Annual Exhibit of Work of Club Members; April—George Alexander, Chicago, Ill.; May—Edward R. Dickson, New York City. Each exhibit will consist of twenty-five prints. The Club rooms are open to the public every Wednesday evening and Saturday afternoon, and all interested are cordially invited to visit the exhibitions.

THE APPEAL OF THE PICTURE. There is a fine note of comment on this in the interesting "Recollections" of Sir Sidney Colvin, now being published in *Scribner's*. He is speaking of "those who declare that painting must appeal to the eye and to the visual emotions only, and stop there—that any sign of mind or meaning behind the visual effect is a positive blot on a picture, and makes of it 'literature in two dimensions' and the like." And the comment is: "Nonsense! of course—and it should need no saying—the primary and essential appeal of every picture must needs be to the eye, by its harmonies and rhythms of line and color, its balancings and massings and proportions and contrasts of light and shade, and by their effect upon the visual emotions. If such appeal and such effect are not forthcoming, or if they fail, the picture is naught; but if they succeed and the picture is a picture indeed, then the more of mind that can be felt behind it, the richer the associations and suggestions it conveys, the better."

CRAMER'S NEW HI-SPEED PLATE. It is many a year since we have had a new plate which has made such a sensation as the Hi-Speed Plate recently introduced by the G. Cramer Dry Plate Co. of St. Louis. The Hi-Speed is the outcome of four years' experiment, and is a really remarkable combination of extreme speed, quality, and latitude, three advantages rarely found in one plate. The portraitist, whether in the studio during the dull, short days of winter, or facing the difficult light conditions of "home" work, will find the Hi-Speed a veritable boon. It is, of course, equally advantageous for the press photographer and for all subjects or conditions demanding ultra-rapidity. The marvel is that, with this desirable rapidity, the Hi-Speed has unusual latitude in development and yields a surprising range of gradation. I hear that the manufacturers are finding it impossible to keep up with the demand, notwithstanding increased facilities for its production.

CARBON PRINTS. A letter recently received tells me that I have given a new interest to the life of a subscriber to *THE PHOTO-MINIATURE* by the suggestion that the subscriber in question send \$5 to George Murphy, Inc., 57 East 9th Street, New York City, the American agents for Autotype Carbon Tissues, with an order for a trial set of supplies for this simple and beautiful process of making permanent prints in colors, including a copy of the new "A B C of Autotype Carbon Printing." Knowing the charm and manifold advantage of the carbon process, with which too few are acquainted — to their own distinct loss—I repeat the suggestion here for all the world.

FLASHLIGHT PHOTOGRAPHY. The thousands of professionals and amateurs who, during the past sixty years, have learned to rely upon the superiority of the Prosch Flash Powders over all others of their class, will be glad to learn that these flash-powders and the full line of flashlight apparatus and supplies identified with the name of Prosch are again being marketed by

the Prosch Mfg. Co. at 61 Fulton Street, New York City. The new catalogue is unusually interesting.

FLASHLIGHT HOME PORTRAITURE is now made a completely efficient and very practical method, robbed of all its old-time uncertainty, risk, and "mussiness," by the introduction of the Halldorson Portrait Flash Lamps, made in four models for home, studio or commercial use, by the Halldorson Company, Dept 8, 1772 Wilson Avenue, Chicago. The very complete handbook on the use of the flashlight, written and illustrated by P. J. Halldorson, which is obtainable for the asking by those who will mention this note, is full of really helpful information, and should be given a place on the reader's photographic bookshelf.

AN APOLOGY. The name of that talented photographer Lejaren à Hiller, of New York City, who is doing remarkable work in the photographic illustrating of stories and advertising, was grievously misspelled as "LeJaren A. Hillyer" in THE PHOTO-MINIATURE No. 177.

COLORING PHOTOGRAPHS. Among the many methods advised for the coloring of photographs, that dealing with the use of oil-colors is, without a doubt, the most satisfactory in results. A convenient and complete equipment of colors for this method, which I can recommend, has been placed on the market under the name of Devoe Photo Oil Colors, by Devoe & Raynolds Co. 101 Fulton Street, New York City.

Research in Graphic Arts

The January meeting of the American Institute of Graphic Arts, held at the National Arts Club, New York City, on the 15th inst., brought out a notable gathering of men interested in the progress of the graphic arts in America. The meeting was in charge of Stephen H. Horgan, member of the Institute. The principal speaker of the evening, Dr. C. E. Kenneth Mees, of the Eastman Kodak Company, came by invitation of the Institute to inaugurate the proposed establishment of a Research Laboratory under the auspices of the Institute, which will accomplish for the printing and reproduction industries of this country what the Eastman Research Laboratory at Rochester is doing for the E. K. Co. in particular and photography in general.

In his address, which was illustrated by lantern-slide diagrams, Dr. Mees first referred to the value of industrial research and the growing tendency to establish research laboratories among the great industries of today. As an example the Eastman Research Laboratory was described, and its purpose defined as the investigation of the scientific basis of photography and its applications.

The field of research for such a laboratory for the graphic arts was then considered, and outlined under three headings or sections: (I) Preparation of Originals (Fine Arts and Photography); (II) Production of Printing Surfaces (Intaglio and Relief Processes); and (III) Printing (Properties of Inks and Papers).

Proceeding, Dr. Mees cancelled any consideration of the fine arts, as too big a subject, and photography, as already provided for by the work of the Eastman Research Laboratory of which he himself is the presiding genius. The different branches of work and materials used in Sections II and III were then discussed briefly in detail, this proving the most interesting portion of

the address. The methods and physical apparatus employed in research laboratories were also briefly reviewed.

Concluding, the lecturer summarized the particular advantages of a research laboratory to the industry with which it was allied, and offered practical suggestions as to the staff required for a small laboratory and the expense involved.

Mr. A. J. Newton, head of the Engraving Department of the E. K. Co., followed Dr. Mees with a few remarks emphasizing the very practical value of systematic research in reproduction methods. Mr. F. E. Ives, of Philadelphia, introduced as "the man who has done more than any other single worker for the advancement of process engraving in America," gave a few humorous experiences in attempting to get the practical workers to avail themselves of the fruits of his research in the printing of half-tone engravings, and cordially endorsed the scheme for a Research Laboratory. Mr. F. A. Ringler, the veteran engraver and electrotyper, of New York City, followed with an offer to "do his bit" in providing the "wherewithal" for the Laboratory, and related the story of his difficulties in persuading the newspapers to use process blocks. Mr. Anderson, of the Electro-Light Engraving Co., and Mr. Percy Marcellus also spoke along the same lines, the meeting breaking up at a late hour. It is, I think, worthy of this record, as the beginning of a new advance in graphic arts, wherein photography has led the way and has already accomplished outstanding results.

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Photographic Emulsions

The production of the light-sensitive plates, films, and papers used in photography is today completely commercialized in the hands of comparatively few firms here and abroad. Commercially, it forms by far the largest branch of the photographic industry, involving an enormous expenditure of capital and labor and resulting, happily, in the general prosperity of all concerned—with an occasional multi-millionaire. As an industry, it is a growth of the last forty years, previous to which the photographer, amateur and professional alike, prepared his own plates and papers as needed for use. The unfolding of this stupendous transformation would give us an interesting tale. But I eschew history. Essentially, the manufacture consists in the preparation of light-sensitive colloid mixtures known as photographic emulsions, and the application or coating of these as thin films on glass plates, celluloid or other flexible bases, papers, and fabrics.

The manufacture of this light-sensitive material on a commercial scale, where the continuous production of a standardized product of uniform quality is essential to success, has developed into a maze of delicate and oftentimes difficult chemical problems, with the resultant need of research laboratories and heaven knows what other accessories, to keep track of what Mark Twain summed up as "the cussedness of things inanimate"—meaning particularly, as I suppose, gelatine and the other viscous colloids. But in themselves, and

dealt with on a small scale, the emulsion processes offer no problems of extraordinary difficulty, are absorbingly interesting and well within the capacity of any photographer with a liking for experiment. As matter of fact, patience, an exact accuracy in detail, and watchful carefulness in manipulation are, in these processes, more vital to success than any deep chemic learning. In proof of which we have the fact that the successful plate and paper makers of yesteryear and today were, and are, devoid of this deep learning, but extremely skilled in working out successful formulas and infinitely patient in their use of them.

Be this as it may, and comparatively simple as the process is, the manufacture of plates and papers for individual use is not a practical proposition for the busy photographic worker in the face of today's markets. Only in the desire to know how these products are made, or to provide oneself with some special variety of sensitive material, can we justify their home manufacture. It is here that we have the scope and purpose of this little book, which aims to satisfy the man who wants to make photographic plates or papers for a special purpose or, at all events, desires to know how such things are made, and is willing to experiment in order to satisfy his thirst for this knowledge. Apparently there are not a few, but many photographers of this sort, since there is a persistent demand for precise information on the subject. To meet this demand I have gathered here a collection of formulas and methods covering the successful manufacture of the plates and papers in everyday use. For these formulas and methods we are indebted to Mr. Alfred J. Jarman, a practical worker of long experience in the processes described. As here given, they have evolved from his continual test and practice during the past twenty years or more, and are, in fact, the methods he is using successfully today. So that, whatever other quality it may lack, the book has the supreme merit of presenting only practical and workable methods and formulas, in which it is true to the intent and purpose of THE PHOTO-MINIATURE as a magazine of photographic information. As far as I can recall, it comprises the only handbook

to this field published since the appearance of the classic researches of Abney and Eder, more than a quarter of a century ago.—EDITOR.

In the beginning—it cannot be too plainly stated that, although the making of sensitive plates and papers offers no really serious difficulties, the reader's success in his emulsion making will depend chiefly on his scrupulously careful attention to detail and exactness in following instructions. As the methods and general treatment followed in the preparation of all photographic emulsions are broadly similar, I propose to describe the first process given with all the detail necessary to a clear understanding of the procedure. Thereafter, supposing the reader to be familiar with these manipulative details, the methods given for the preparation of other emulsions will be somewhat abbreviated in description.

Discouragement. It is not unlikely that, on reading the process first to be given for the preparation of a slow gelatine-bromide emulsion, the procedure may seem hopelessly intricate. There is, however, no reason for discouragement. Emulsion making, like the poaching of eggs, is much simpler in the doing than in any description of how it is done. In actual practice the seemingly complex details of the description work out as a comparatively simple process. And the work is so absorbing in its interest that the difficulties which crop up, alike in commercial as in amateur practice, are an incentive to further effort rather than a discouragement. Similarly, the materials and apparatus required, apparently formidable when set down in one place, are such as will generally be found in most photographic work-rooms, or can easily be provided or devised for the work in hand.

Points in Practice. There are a few points in emulsion practice which, well considered and understood in the beginning, will save the reader from after-failures and the waste of time and material involved. These points cover materials, equipment, and manipulation. We will take them up in detail.

Materials. We will need a few ounces of gelatine—and there are gelatines especially made for photographic use. As the German gelatines formerly so largely used in emulsion making are now somewhat difficult to obtain, and rarely of pre-war quality when obtainable, the gelatines made by the American Glue Company (Hard and Silver Label brands) are generally specified in the formulas herein given. I have found these fully equal to European gelatines in quality and use them with complete success. British readers can rely with equal confidence on Simeon's gelatines, made by the British Gelatine Company. Those who prefer, and can, may substitute Heinrich's Hard, Nelson's X Opaque, or Coignet's Gold Label (soft) in the formulas given. "Hard" gelatines are chiefly used in emulsion making because these "hold up" well in the heating and remelting processes, wherein all gelatines are apt to "go to pieces" in the matter of "setting" or hardening. It would be easy to write a big book about gelatine—its virtues and vices, but this is not permissible here and now. Briefly, the more the reader knows about gelatines the better, as far as making emulsions is concerned. One point may be mentioned, as to the use of alum as a hardener in emulsion formulas. There is a limit to the proportion or amount of alum which may be added to each ounce of emulsion before coagulation will cause trouble. This limit is 6 grains of alum to each ounce of *hard* gelatine, and 12 grains to each ounce of *soft* gelatine used in the emulsion.

Alcohol. In this year of grace the American reader may have a little trouble in securing even the small amount of alcohol required for his emulsion making. It is important that only pure grain alcohol be employed, the use of wood alcohol, Columbian spirit, and the other denatured alcohols being unsuitable. Pure grain alcohol can be obtained at present only by first procuring a license from the Internal Revenue Bureau, at a cost of \$5, and will probably cost from \$15 to \$20 per gallon. The "pure alcohol" generally sold by druggists at about \$1.50 per pint contains a very small proportion of formaldehyde. This addition is in no

way harmful in emulsion making, so that the reader may safely use it in his experiments.

Glass Plates and Basic Papers. The glass used in plate-making should be selected for its even thickness, clearness, and freedom from air-bubbles, scratches, small lumps or clots, and other surface defects. Old or rejected negatives are well adapted for the purpose. These may be perfectly cleaned (a vital point) by placing them, one at a time, in a boiling solution of strong washing soda. This will dissolve the gelatine coating and any substratum on the plates. As soon as the temperature has become lowered so that the plates may be conveniently handled, they may be lifted out one by one, and the gelatine surface removed by rubbing with a soft rag. Rinse the plates under a tap, place them in a tray or tank of clean water slightly acidulated with hydrochloric acid for a few minutes. Finally wipe each plate well on both sides with this acid water, using slight pressure, rinse again under the tap and set aside in a rack away from dust to dry. If this cleansing process is thoroughly carried through, no substratum will be needed before their after use. For this reason no mention of substratum or the need of it will be found in the methods herein given.

Substratum for Plates. If, however, the reader desires to coat his glass plates with a substratum as a precaution against after-frilling or blistering, this should be done after the cleansed plates are thoroughly dry. For the substratum, dissolve 6 grains of chrome alum in 2 ounces of distilled water (boiling); add this to a hot solution of 1 ounce (avd.) hard gelatine in 48 ounces of distilled water with constant stirring; finally add 1 ounce pure alcohol and stir to ensure complete admixture. Filter this, as later described, and it is ready for use. The coating of the plates with substratum should, of course, be done well in advance of the coating with emulsion, so that the substratum has become thoroughly dry and hard. Needless to say, such plates must be dried and kept free from any dust until the time for emulsion coating arrives.

The basic papers employed for coating may be any pure paper, such as Rives, Steinbach, or the drawing

and artists' papers offered by Whatman. The baryta coated papers sold for photographic use are advised for the reader's first experiments.

Apart from these we will need a small supply of silver nitrate (recrystallized), that known as "fused silver nitrate" or lunar caustic No. 1 being best; ammonium bromide; potassium bromide; potassium iodide, nitric acid; strong ammonia water .880; and a gallon of distilled water.

Apparatus. Accurate scales; two or three glass graduates; stoneware crocks with lids or covers of the same material: two 2-pints and 2 half gallon capacity; a yard of the coarse-mesh canvas used in embroidery or Berlin wool work; Fahrenheit thermometer; a darkroom lantern provided with deep ruby and orange "safe lights" or screens; a small iron laboratory retort stand and two or three laboratory or chemists' flasks; a supply of absorbent cotton and cheesecloth; a few strips of clean white pine wood for use in stirring emulsions (in place of glass rods, which, by friction against the sides of the crocks during stirring, are apt to set up electrical action causing chemical decomposition in the emulsion, resulting in fog); a kerosene lamp chimney of the usual shape (which I have found to be the most desirable sort of a filter vessel for emulsion work); a slab of slate or marble for the "setting" of coated plates, and an emulsion trough for use in coating paper. With these, a few fairly large enameled ware saucepans, a gas-stove and a supply of ice in warm weather, the equipment will be fairly complete.

A Drying Closet. This particular item, essential to the proper drying of plates and papers, is often found to give unexpected difficulty. All that is required, however, is a good-sized cupboard, closet, or well-aired room, where coated plates or papers may be dried safely protected from every trace of actinic light and dust. Obviously a room, fitted so as to be light and dustproof, and which can be locked when in use, offers the best facilities for the purpose; but any closet or cupboard construction similarly fitted will serve. If the basement of the premises serves as the reader's emulsion room, it will be easy to provide the drying

closet in a convenient corner. Such a closet should have shelves or strips to carry the drying racks for plates, or from which the coated paper sheets may be suspended. A supply of white pine wood racks (without drainage gutters) and *wooden* photographic clips will complete this part of the equipment. We can now take up the preparation of our first emulsion.

A SLOW GELATINE-BROMIDE EMULSION

The Formula. The proportions given are sufficient for the making of several dozen dryplates, 4 x 5 or 5 x 7 sizes, of a rapidity suitable for landscape work, interiors and copying. Weigh out: Hard gelatine (A. G. Co.), 80 grains; ammonium bromide *or* potassium bromide, 64 grains; distilled water, 3 ounces (fl.) Place the gelatine in a two-pint stoneware crock, add the bromide, viz. 64 grains of *either* of the salts mentioned, *not 64 grains of each*, pour the distilled water on this and allow the mass to soak from one-half to one hour until the gelatine has absorbed the water. Then place the crock and its contents in a larger saucepan containing sufficient water to surround the crock above the level of the gelatine mass inside it, and standing the crock on two small pieces of wood, so that the water has full access to the bottom of the crock. Heat the water in the pan to a temperature of 125° Fahr. After about fifteen minutes the temperature of the contents of the crock will equal that of the water in the outer vessel, which should not be less than 120° nor more than 125° Fahr. The contents of the crock should be stirred occasionally during the heating, with a white pine strip kept for this purpose, to facilitate its solution. Now place in a clean glass flask nitrate of silver (fused or recrystallized) 80 grains; distilled water, 4 ounces (fl.) Shake the flask to dissolve the silver nitrate, after which place the flask in a larger vessel containing water and heat until the silver solution reaches 120° to 125° Fahr. These preparatory opera-

tions may be carried through in daylight or gaslight, but *all* the operations thereafter, from the mixing of the emulsion hereinafter described to the coating, drying and packing of the plates, must be done in a room illuminated only by a safe, deep ruby light.

Making the Emulsion. In the darkroom, under the deep ruby light mentioned, add the silver nitrate solution to the hot bromized gelatine solution slowly, stirring the mixture with the clean pine stick during the addition. When the silver has been thoroughly incorporated with the gelatine, rinse the flask with an ounce of grain alcohol and add this, with stirring, to the emulsion in the crock. This will remove all the silver from the flask and aid in the emulsifying or ripening of the gelatine-bromide of silver mixture which follows. Wash the pine stick and put it away in the dark for future use.

The crock is now placed in a larger pan or vessel containing hot water, covered with its lid, and the temperature of the water kept at 150° Fahr. for three hours. During this process, the crock may be removed from the hot water every half hour, held by a thick cloth, and gently shaken around or stirred with the pine stick. At the end of the three-hour period, it will be found that a drop or two of the emulsion, taken from the crock on a strip of glass and (outside of the darkroom) viewed by gaslight or daylight, will present a blue color by transmitted light. It may be that this test will give the bluish color after two and a half hours heating. Whenever the emulsion reaches this stage, it has reached the necessary degree of sensitiveness required for its purpose.

At this point there must be ready at hand the following, prepared previously: In a thick glass place hard gelatine (A. G. Co.), 270 grains; Silver Label gelatine (A. G. Co.), 270 grains; and on it pour distilled water, 8 ounces. As soon as this is thoroughly swelled by the absorption of the water, add it to the emulsion in the crock (of course, under the ruby light). When the water in the vessel surrounding the crock has fallen to 120° Fahr., keep the emulsion at this temperature for half an hour, stirring it with the pine stick during

this period until the added gelatine is thoroughly incorporated with the emulsion. Add 1 ounce of alcohol to the mixture, stir well, and set the crock aside, covered and protected from light, until the emulsion is thoroughly set, i. e. in a somewhat stiff jelly. If the emulsion is made, as described, at night, it will be ready for treatment the following day or at any time during a week following, the alcohol serving as a sufficient preservative during this period.

Washing the Emulsion. Procure a piece of embroidery canvas with a mesh of about one-eighth of an inch. This usually comes a yard in width, and a half-yard will make two pieces of the size needed for our purpose. Wash both pieces of canvas thoroughly in hot water, using no soap. This will rid the canvas of its stiffening matter (or filler), after which it is ready for use.

Place a pint of distilled water in one of the small crocks. Cut the set emulsion jelly into lumps with a bone or ivory knife and place one or two of these pieces of jelly in the middle of a piece of canvas. Twist this tightly about the jelly with the right hand, holding the bag-like contrivance so formed firmly in the left hand. Now twist or wring the canvas bag and its contents with considerable force until the emulsion is forced through the canvas in shreds and drops into the crock holding distilled water. This operation resembles the housewife's method of preparing fruit jellies. Continue the wringing process until all the emulsion jelly on hand has been treated, then fold the piece of canvas double, place it over the top of the crock containing the shredded emulsion, and tie it with a good length of string below the rim of the crock. Now turn the crock upside down, so that the water (which now holds the salts of chemical decomposition) may drain away. In the course of a few minutes clean, cold water may be poured *through* the canvas until the crock is nearly full, when it is allowed to stand for five or ten minutes, then drained off. Five or six such washings will be required, after which the crock may be inverted and allowed to drain for an hour, when the emulsion will be ready for melting and coating.

Melting and Filtering the Emulsion. Thus shredded

and thoroughly washed, the emulsion is melted by placing the crock and its contents in a larger vessel of hot water, after removing the canvas and shaking any adhering shreds into the crock. Wash the canvas in hot water, wring it as dry as possible, and put it aside in a dark place for future use.

The temperature of the water in the outer vessel surrounding the crock of emulsion is now brought almost to boiling point. As soon as the emulsion has become thoroughly melted, add half an ounce of pure grain alcohol and stir well with a clean pine stick.

The melted emulsion must now be filtered. This is best done by the use of the kerosene lamp chimney already mentioned, inverted and held in position over the second small crock (previously well washed in hot water) in a small iron retort stand. To form the filter a double thickness of cheesecloth is firmly tied about the narrow end of the chimney with soft white string, the rough edges or ends being trimmed with a pair of scissors. A tuft of absorbent cotton is now pressed, not too tightly, down upon the closed end of the filter thus devised, so that the hot emulsion may readily pass through, and a strip of clean glass about an inch wide, long enough to stand an inch or so above the top of the inverted chimney, the bottom end of the strip resting on the cotton plug, will hold the plug in place during the filtering. The small crock is now placed beneath the closed (lower) end of this filter to receive the emulsion as it drips through the cotton. A 4- or 8-ounce graduate answers well as a container for pouring the hot emulsion upon the plates in coating them.

Coating Plates. Unless the reader happens to be skilled in the hand varnishing of negatives after the manner of earlier days, the coating of dryplates with emulsion is an operation which will call for practice. Before beginning the coating, however, a slab of slate or marble must be provided and leveled on a nearby table on which the plates are laid, as coated, to allow the coating of emulsion to set. This slab of slate should be rubbed over with a block of ice or ice-cold water and roughly dried just before use, and kept cold during use by repeating this treatment—especially during

warm weather. A supply of glass plates, cleaned and prepared as already described, should be placed at hand in a convenient rack. Needless to say, the place used for the coating operation must be scrupulously clean and free from dust, as well as absolutely "safe" in the detail of illumination.

The coating of the plates is done as follows: The plate is held securely at the lower left-hand corner, between the tip of the thumb and the tip of the first finger, the second and third fingers being extended beneath the plate so that it is steadily balanced and completely under control as far as the inclination of its upper surface is concerned. A small pool of the hot emulsion is now poured from the graduate or container at about the center of the plate, which at the same time is gently tilted or inclined so that the pool of emulsion spreads toward the upper right-hand corner of the plate. Another slight tilting or inclination of the plate now leads the spreading pool of emulsion over to the upper left-hand corner, along the top and left-hand edges without any dripping over, thence covering the lower half of the plate (barely touching the tip of the thumb at the lower left-hand corner) and at last reaching the lower right-hand corner of the plate, from which the emulsion is drained off into the graduate by resting this corner at a slight angle against the inner surface of the graduate. If this fascinating operation is properly carried through, the plate will have received a thin, even film of the emulsion, without the formation of streaks or air-bubbles, and without the emulsion being allowed to get over any edge of the plate. Gauging the size of the pool of emulsion sufficient to flow over and cover the whole surface of the plate without any great excess, and the exact placing of the pool on the plate to give an expeditious and easy flow to the coating, are delicate details in which skill comes by practice.

It is well to warm the plates slightly, or to breathe upon the surface of the plate just before pouring on the emulsion. Immediately after being coated, the plate is carefully laid down on the leveled slab and left there until a number of plates have been coated so that the emulsion coating may set. As soon as this setting is

seen to be accomplished, the plates are carefully removed from the slab, placed in an open wood rack (without a gutter), and put into the drying room or closet to dry for at least twelve hours. When thoroughly and uniformly dry, they should be packed face to face in lots of six, wrapped in black needle paper, and boxed ready for use.

After the required number of plates have been coated, any emulsion remaining unused may be kept in the crock, covered with its lid and well protected by several thicknesses of stout brown paper, and placed in a cool, dry place away from actinic light until required for use. An emulsion such as here described will keep its good qualities for at least three days. It should not be forgotten, however, that each time a washed emulsion is remelted it becomes more sensitive (generally speaking more liable to fog) and will yield a softer image in use.

RAPID GELATINE BROMIDE EMULSIONS

Those desiring to make more rapid emulsions than that just described will find either of the two formulas following to give excellent results. No. 1 is rich in silver and yields pleasing negatives of a full-bodied character, being somewhat more rapid than No. 2. The preparation of these emulsions should follow the lines laid down for the slow bromide emulsion.

Formula No. 1. Place hard gelatine (A. G. Co.), 80 grains in a small crock, add ammonium bromide *or* potassium bromide, 166 grains *and* potassium iodide, 18 grains, and pour over this distilled water, 3 ounces (fl.). Allow this to stand for half an hour, then place the crock in a larger vessel containing cold water and heat until the temperature of the emulsion reaches 120° Fahr. Dissolve recrystallized silver nitrate (or lunar caustic No. 1), 230 grains in distilled water, 3 ounces, using a glass flask as previously described and heat this to 120° Fahr. Now in the darkroom, under a deep ruby light, add the nitrate of silver solution to the bromo-

iodized gelatine solution a few drops at a time, stirring well with a clean pine wood stick. When all the silver solution has been added, wash out the flask with half an ounce of grain alcohol and add this to the emulsion in the crock with stirring. Cover the crock with its lid, place it in the vessel of hot water, and bring this to boiling point, at which heat it should be kept for 30 minutes, being stirred at intervals with the clean pine stick.

While the emulsion is cooking, weigh out: Hard gelatine (A. G. Co.), 190 grains; Silver Label gelatine (A. G. Co.), 90 grains. Cover this with distilled water and let it soak while the emulsion is cooking as above described. At the end of the cooking period, add the now softened gelatine to the emulsion in the crock, regulate the heat so that the temperature will decrease to 120° Fahr., and stir the mixture well until the added gelatine has completely dissolved, gradually decreasing the temperature to 90° Fahr. At this stage, add 1 drachm of strong ammonia water to the emulsion, stir with the pine stick, cover the crock and set it aside in a cool, dry place until the emulsion sets to a fairly firm jelly. If made at night it will be ready for treatment the next day.

Wash, drain, remelt and filter as described for the Slow Bromide Emulsion, after which the emulsion is ready for coating.

Formula No. 2. Place in a small crock: Hard gelatine (A. G. Co.), 210 grains; ammonium bromide, 87 grains; potassium iodide, 5 grains; and pour over this, distilled water, 3 ounces (fl.). Heat as before to 130° Fahr. Meanwhile, in a chemists' flask, dissolve nitrate of silver (recrystallized) or lunar caustic No. 1, 130 grains; citric acid, 5 grains; in distilled water, 2 ounces (fl.), and heat this likewise to 130° Fahr. In deep ruby light gradually add the silver solution to the bromo-iodized gelatine with constant stirring, and keep the emulsion at 130° Fahr. for one or one and one-half hours. Stir the mixture frequently during this period, using a clean pine stick for this purpose. Test as to color after an hour's heating, as described for the Slow Bromide Emulsion. Set aside to cool; wash, drain, and

remelt as before, adding pure alcohol, 1 ounce, during the remelting. Filter before coating, etc., all as already described.

EMULSIONS FOR LANTERN PLATES AND TRANSPARENCIES

The quality and composition of the emulsions required for lantern-slide plates and transparencies differ somewhat from those used for negative plate making. All the operations of mixing, emulsifying, and coating follow the general lines indicated for the processes already given, but a greater degree of care and caution should be given at every stage. The essentials here are fineness of grain in the sensitive film, perfect freedom from fog tendencies, and a long range of gradation capacity. The glass selected for lantern-plate work must be more carefully scrutinized for defects than for negative plates, and the cleaning of the plates must have particular attention, since the slightest defect in a lantern plate is magnified considerably when the slide is exhibited upon the lantern screen. For this reason, apart from care in the selection of the glass, etc., particular pains must be taken to filter the solutions and water employed throughout the process, as well as to avoid dust and uncleanness. As part of these general precautions, a small bag of double-thickness cheesecloth, holding a large tuft of absorbent cotton, should be attached to the water faucet, so that all the water used in the washing of the plates and emulsions may be filtered free of dirt specks, iron rust, and all organic matter. The crocks and vessels used should be scrupulously clean and extra precautions should be taken to avoid dust in the coating and drying of the plates.

Preparing the Emulsion. The formulas here given are sufficient for an experimental emulsion for a few dozen plates. If it is desired to work on a larger scale the proportions may easily be increased as indicated by the first batch of plates produced. All emulsions make up to a larger bulk after the heating and wash-

ing processes than their original proportions would seem to promise. Any one of the emulsions given for lantern plates will give excellent transparency plates, but generally the print-out emulsions offer advantages here as better adapted for after-toning, by which the color of the picture image may be pleasingly varied according to the subject.

The Formula. Weigh out into a small crock: Hard gelatine (A. G. Co.), 250 grains; ammonium bromide, 175 grains; potassium iodide 5 grains. Pour over this distilled water, 4 ounces (fl.), and allow to soak for an hour, then melt by placing the crock in a larger saucepan containing water—all as before. While this is proceeding, dissolve in a clean glass flask: nitrate of silver (recrystallized or lunar caustic No. 1), 230 grains in distilled water, 4 ounces (fl.), stirring with a glass rod to facilitate solution if this is necessary. When solution has been obtained, pour 3 fluid ounces of this silver solution into a clean glass graduate, and add to this, drop by drop, strong water ammonia until the precipitate of silver formed (oxide of silver) has been completely dissolved. Now add to this the remaining ounce of the silver solution, which will cause the solution to become somewhat cloudy.

Emulsifying. Now, under deep ruby light, add the silver solution, a little at a time, to the hot bromo-iodized gelatine already prepared, stirring well during this addition with a clean pine stick. As soon as thorough admixture is obtained, add half an ounce of pure grain alcohol from a graduate, stir well for a few moments, then cover the crock, place it in the saucepan of hot water, and keep the temperature of the water at 120° Fahr. for one hour. Stir the emulsion with the pine stick three or four times during the hour, and at the end of this period, set the crock aside in a cool place (of course, thoroughly protected from actinic light) so that the emulsion will become cold as quickly as possible.

Washing and Draining. As soon as the emulsion in the crock has become well set, cut it up, squeeze through canvas into a clean crock, wash half a dozen times in filtered water, then invert the crock to drain for one hour, all as described for the negative emulsion.

Melting and Filtering for Coating. As soon as the washed emulsion has drained for an hour, place the crock in the saucepan of hot water, bring the temperature of this to 140° Fahr., and, when the emulsion is thoroughly melted, add one ounce of pure grain alcohol, stirring well with the pine stick to secure complete mixture. Be sure that the alcohol is measured in a thoroughly clean graduate, as any trace of silver in the graduate at this point would result in a fogged emulsion. The hot emulsion prepared as described is now carefully filtered in the manner previously described, after which it is ready for coating. In preparing lantern plates, it is preferable to coat all the emulsion at one time and avoid remelting and after-coatings.

Coating the Plates. This does not differ from the method already given, but where many small plates are to be coated it is convenient and perhaps saves time to use a pneumatic plate-holder, such as was in general use in wet collodion days. This appliance consists of a vulcanized rubber ball with a circular top and a small hole in the middle, so that when the circular top is pressed against the under (glass) side of a plate, by first squeezing the ball to expel the air and then releasing the hand pressure, the plate is securely held in a horizontal position and can be inclined or held at any desired angle without slipping. When large quantities of plates are coated, as in plate factories, this is done by means of a machine and a different method is used. But a skillful worker, by hand-coating, can coat as many as six hundred 5 x 7 plates per day. The setting and drying of the plates is done as already described for negative plate-making. Care is needed to ensure uniform drying by maintaining an even, dry temperature in the drying room or closet. A temperature of 80° Fahr. is most favorable for this particular purpose.

A Printing-Out Lantern Plate Emulsion. Very desirable lantern-slide or transparency plates can be produced by the following method, which gives a printing-out emulsion similar to the well-known gelatino-chloride printing papers, as distinct from the usual lantern plate which gives a latent or invisible image by exposure and calls for development. Print-out lantern

plates are, of course, much less rapid than develop-out plates, but have the advantages that they are practically grainless and can be toned in a variety of tones or colors by after-toning methods.

Preparing the Emulsion. The general preparation of a print-out emulsion differs little from that already described for negative emulsions, except that a print-out emulsion can be made under an orange-colored light, which is much more convenient than working in the deep ruby light used in preparing negative emulsions, and the inexperienced emulsion maker may be well advised to begin his emulsion experiments with the preparation of this sort of emulsion, so that he may become accustomed to the various operations with greater facility because of the more ample illumination permitted in this method.

Formulas. Prepare the three following: *A*: Distilled water, 6 ounces (fl.); hard gelatine (A. G. Co.), 384 grains; ammonium chloride C.P. 12 grains; Rochelle salts, 23 grains; citric acid (crystals) 45 grains. *B*. Distilled water, 1 ounce (fl.); powdered potash alum, 45 grains. *C*. Distilled water, 2 ounces (fl.); nitrate of silver (recrystallized), 40 grains.

Place the ingredients of *A* in a small, clean crock and allow to soak for a few minutes, then place the crock in a larger saucepan half filled with water and heat this to boiling point. Stir the contents occasionally with a glass rod to ensure thorough admixture and solution. Heat *B* in a small flask to boiling point. Having *C* already dissolved, add this slowly, under a safe orange light, into *A* from a clean glass graduate, stir well and next add the boiling alum solution *B*, stirring during this addition. Lastly, add to the hot emulsion in the crock 1 ounce of pure alcohol previously measured out into the graduate which contained the silver solution. Stir the emulsion well for a few minutes, then set aside to cool. When the emulsion has set sufficiently, squeeze it through canvas as indicated for gelatine-bromide emulsions, and wash for 10 minutes each in five changes of water, after which allow to drain for a full hour.

Now prepare a silver solution by dissolving nitrate

of silver (recrystallized), 120 grains in distilled water, 2 ounces (fl.) and have this at hand ready for use.

Melting, Filtering, and Coating. After the washed emulsion has drained sufficiently, melt it by placing the crock in a vessel or pan containing water heated to 180° Fahr. Stir well to secure complete solution and add 3 drams of the nitrate of silver solution above last mentioned. Stir during this addition and finally add 1 ounce of pure alcohol. The reason for this addition of silver to the washed emulsion is to provide the free silver essential to a print-out emulsion.

The filtering and coating of this emulsion is done precisely as described for negative plates, except that the emulsion may be more thoroughly drained off the plates to secure a thinner film. The cover glass plates sold for lantern-slide making, or discarded lantern-slides thoroughly cleansed, are well adapted for use in this home preparation of lantern-slide plates. Matt "opal" glass or stout white celluloid may also be used.

Printing. These print-out plates are printed in contact with a negative in the ordinary printing frame, the progress of printing being judged by opening the frame and looking through the positive in the usual way. As this necessitates the temporary removal of the positive and its correct registration on the negative after examination, it is advised to hinge the negative and positive plates together with a strip of passe-partout gummed paper before printing.

Print until the deeper shadows in the positive are seen to be well bronzed. Wash in five changes of water and tone in a bath made up a few hours previous to use as follows: Filtered water, 30 ounces (fl.); gold solution (15 grains gold chloride in 15 ounces of filtered water—kept in an orange glass bottle), 2 ounces; saturated solution of borax, 1 ounce (fl.). The progress of toning is seen by examining the plates by reflected light against a sheet of white paper. When the desired tone has been reached, place the plates in a bath made up of water, 20 ounces; common salt, 1 ounce. After a few minutes, wash in cold water and fix in a bath made up as follows: Dissolve separately: *A*—16 ounces hyposulphite of soda in 32 ounces of water. *B*—water,

5 ounces (fl.); sodium sulphite (dry), $\frac{1}{2}$ ounce (av.); acetic acid (No. 8), 3 fluid ounces. When thoroughly dissolved, add *B* to *A* and filter through absorbent cotton before use. The fixing of the plates in this bath will be completed in about 8 to 10 minutes. Finally wash in running water for half an hour and place the plates in a rack to dry away from all dust.

AN EMULSION FOR PROCESS PLATES

An excellent emulsion for process plates, or plates intended for the reproduction of black-and-white originals, may be prepared as follows:

Formula No. 1. Place in a clean crock: *A*—Distilled water, 11 ounces (fl.); potassium bromide, 300 grains; ammonium bromide, 70 grains; potassium iodide, 10 grains; hard gelatine (A. G. Co.), 600 grains. *B*—In a 16-ounce graduate, dissolve 460 grains nitrate of silver in 10 ounces (fl.) of distilled water, crushing the crystals with a glass rod to facilitate solution. To this add, a few drops at a time, liq. ammon. fortis .880 until the precipitate at first formed is almost but not quite dissolved.

Preparing the Emulsion. Place the crock containing *A* in a larger pan of water and heat as already described to 110° Fahr. Stir occasionally with a clean pine stick. When complete solution has been obtained, take the hot gelatine mixture and the ammoniacal-silver solution into the darkroom and, under the deep ruby light, add *B* to *A*, a few drops at a time, stirring well with a clean pine stick during the addition. When all of *B* has been added to *A*, wash out the graduate with 1 ounce of pure alcohol and add this to the contents of the crock. Cover the crock thoroughly, place it again in the larger pan of hot water, and keep it at a temperature of 110° Fahr. for one hour, stirring the emulsion from time to time with a clean pine stick. After one hour's heating, remove the crock from the hot water container, protect well from light, and place it in a cool place or

ice-box so that the emulsion will become cold and set as quickly as possible.

Washing, Melting, and Filtering. As soon as the emulsion has set to a jelly, it may be washed as already described and left to drain. When re-melting before filtering, add 2 fluid ounces of grain alcohol, stir well, and filter as already described, after which the coating of the plates may be proceeded with. Thoroughly clean plates are vital in this method, as the least trace of dirt or dust will prove fatal in after-use. This emulsion is very suitable for lantern-slides from diagrams or line originals. It gives negatives or positives with absolutely clear glass shadows and strong lights.

A GELATINE-BROMIDE PAPER EMULSION

The formula here given is for the preparation of a moderately rapid bromide paper, giving vigorous black images with any of the developers generally advised for bromide papers, and a fairly long range of gradation. All the operations detailed for the making of the emulsion, coating and drying the paper (except the making up of *A* and *B*), must be carried out in a safe ruby light. The general procedure does not differ from that advised for the negative emulsion first given.

The selection of the base paper is important. For the first attempts the reader is advised to use a baryta-coated paper of heavy weight and thickness. This will give a smooth or semi-matt surfaced bromide paper suitable for contact prints and small enlargements. After skill in coating has been acquired, Whatman's drawing and artists' papers will be found to offer a wide variety of papers adaptable for this process, where special surface effects or tinted bases are desired.

Formula. *A*: Place in a clean stoneware crock, distilled water, 4½ ounces (fl.) and hard gelatine (A. G. Co.), 1½ ounces (av.). Let this soak for half an hour, then stir in ammonium bromide, 225 grains; strong water ammonia, 1½ drachms; grain alcohol, 6 drachms.

Stir this well with a clean pine stick to secure complete admixture. At the end of a second half hour, place the crock in a larger pan containing water and gently heat the contents of the crock to a temperature of 140° Fahr.

While this is proceeding, prepare *B* as follows: *B*—Dissolve nitrate of silver (recrystallized), 300 grains in distilled water, $4\frac{1}{2}$ ounces (fl.). Stir with a glass rod to facilitate solution and transfer to a chemist's glass flask. Rinse the graduate in which the silver solution was prepared with grain alcohol, 6 drachms, and add this to the contents of the flask, which is now heated to 140° Fahr.

As soon as the gelatine mixture *A* is thoroughly melted and liquid, at the temperature stated, add the *B* solution, a few drops at a time, with stirring, under a safe ruby light, using the pine stick for this purpose. When all of *B* has thus been added to *A*, put a generous drop of the mixture on a small strip of clean glass and place this strip aside, under cover, for after-test purposes.

Ripening. Replace the stoneware lid on the crock containing the emulsion, and over this securely tie a double thickness of brown or opaque paper to prevent the slightest trace of light from reaching the emulsion mixture. Place the crock in a larger vessel containing water heated to 140° Fahr., and keep the water at this temperature for from two to three hours. During this period the crock should be removed from the larger pan and, held with a thick cloth, gently swirled in the hands to thoroughly agitate and mix the contents. At the end of 2 hours' emulsifying, open the crock (always in safe light) and take a drop or two of the emulsion with the pine stick, placing these on the glass strip already mentioned. Replace the lid of the crock and let it continue heating. The glass test-strip may now be viewed by gaslight or daylight. The first drop taken will have a decided yellow tint, the other drops of ripened emulsion will appear more opaque and of a greyish tint. If, however, it shows a bluish tint, this indicates that the emulsion is sufficiently cooked and the heating process should be stopped. This blue tint, which is the test of sufficient ripening, is usually reached

in 3 hours, but sometimes in 2 hours. A test will indicate. Perhaps in his first experiment, the reader may be content to let the ripening proceed for three hours and dispense with the color-test.

When the cooking is complete, as above, take 1 ounce of grain alcohol to which 2 drops of nitric acid have been added, and stir this into the ripened emulsion, after which add 200 grains of hard gelatine to the mixture and stir this well, giving it time to melt and be thoroughly incorporated with the emulsion.

Fifteen or twenty minutes after this addition of gelatine, return the crock to the vessel of hot water for a few minutes only and stir well. Then put the crock aside in a cool place, well protected from all actinic light, until the emulsion has become cold and well set in a jelly.

Washing and Filtering. When the emulsion is well set, it may be cut up, squeezed through canvas and washed in several changes of water, all as described under the first plate emulsion process given. This completed, the emulsion is allowed to drain thoroughly for an hour. At the end of this operation, add grain alcohol, 2 ounces, and 2 drachms of a chrome-alum solution made by dissolving 10 grains of chrome alum in 2 drachms of distilled water. Stir with the pine stick to secure complete admixture, remelt, and filter as before, after which the emulsion will be ready for coating.

Coating the Paper. This operation calls for considerable care and dexterity, especially in the coating of small sheets by hand. At first the beginner is sure to get unevenly coated sheets, but a little practice will give the required skill in handling.

A Trough. We will need a small wooden trough, about 9 inches long and 8 inches wide, so constructed that the sides (not ends) slope to each other like a flattened V, so that the emulsion will be retained between them. This trough should be coated with two applications of shellac varnish, the first coating to be thoroughly dry and hard before the second coating is applied.

Conditioning Paper. Experience proves that the successful coating of papers with photographic emulsions

is largely dependent on the hygroscopic condition of the paper at the time of coating. It is important, therefore, to "condition" the paper beforehand. This is done by cutting the paper into sheets of size convenient for coating, rolling them loosely and storing them in a somewhat damp, cool place for several hours before coating is attempted. This dampness will bring a surface properly receptive of the emulsion and ensure an even coating. If, on the other hand, the paper is very dry, the coating will show an abundance of minute air-bubbles, which can only be remedied in part by quickly passing the paper over the emulsion a second time. Where dryness of the paper is suspected or indicated too late for the "conditioning" first mentioned, an even coating may generally be secured by passing the sheets of paper to and fro over a saucepan or tray containing boiling water until it is sufficiently dampened for the purpose.

If a few sheets of paper about 5 inches in width and 18 or 24 inches long are to be coated, they are first prepared by folding the ends of each sheet over so as to form a lap about $\frac{3}{8}$ ths of an inch wide, rubbing the folded edge down with the thumb-nail. This folded lap will serve to suspend the coated sheets for drying. If the sheets are, say, 8 inches in width, then strips of wood $\frac{1}{2}$ inch wide and 8 inches in length will be required, the ends of the sheet of paper being folded upon these strips and secured thereto by two wooden clips at each end of the sheet. Under no condition may metal clips be used for this purpose.

These preparations being completed, the filtered emulsion, at a temperature of 80° Fahr., is poured into the wooden trough. In wintertime, or during cold weather, the temperature of the emulsion may be as high as 100° or 90° Fahr. at the beginning, since each sheet of paper will lower the temperature, and, as this occurs, the emulsion becomes thicker and less easy to coat.

Hand-Coating. A sheet of paper is now taken in the two hands and gently bent until it takes the shape of the letter J, the lower end being in the left hand and directly over the emulsion trough. Now lower the

sheet until the lower end comes into contact with the emulsion evenly across the width of the sheet. Slowly raise the left hand and lower the right one so that the whole surface of the sheet passes into contact with the emulsion in a uniformly steady and continuous movement and receives an evenly uniform coating of the emulsion as it passes. The sheet is now gently waved to and fro, coated side uppermost, over a block of ice, then quickly turned over and waved in the same manner coated face down, until the emulsion coating has set sufficiently to permit the sheet of coated paper to be suspended (by means of the lap or wooden strip mentioned) away from all actinic light until thoroughly dry.

After Drying. If the paper is coated at night it will be properly dry on the morning following. About 2 inches should be cut squarely from the end of each sheet to get rid of the fold or lap and the unevenly coated portions of the strip at the beginning and end of the sheet. Finally, the coated and dry sheets should be rolled up, sensitive side outward, or cut into sizes ready for use, being stored in a cool, dry place in rolls, or in sheets packed one sheet on the back of another as may be most convenient. Black paper containers are advisable, and if the paper is kept in cut sizes it will keep better if under light pressure. It is important to note that all handling of the sensitive paper, after drying, should be done with the hands clothed in clean, white cotton gloves, so that the fingers will not come into contact with the sensitive surface.

DEVELOPMENT-PAPER EMULSIONS

The development (gaslight) papers so generally used today, in place of the print-out papers of earlier years, are technically known as washed chloride papers, the washing out of the soluble silver salts or "free silver" present in the normal chloride emulsion differentiating this class of papers from print-out chloride papers.

Possibly because of the more complex character of the silver compound in a washed chloride emulsion, or because the chemical balance of such an emulsion is more delicate than in a bromide emulsion, the production of a really satisfactory development paper of uniform quality is much less simple than the making of plain bromide papers. Which word may serve as warning to the amateur emulsionist. The formulas which follow have been simplified as far as possible and have given me very satisfactory results.

Washed chloride papers are much less light-sensitive than bromide papers. Their preparation may therefore be carried on in a room illuminated with a fair amount of orange-colored light—a welcome change from the uncertain darkness of the deep ruby light advised for bromide emulsion making. The chloro-bromide emulsion given in Formula No. 3 is an exception to this rule. In all cases, however, the gelatine solution (*A*) may be prepared and melted in daylight or gaslight, care being taken that the addition of the silver solution (*B*) and all after operations are carried out in a safe non-actinic light. The general procedure does not differ from that advised in preceding pages.

Formula No. 1. Thoroughly cleanse two small stoneware crocks with hot water, using no soap or chemical cleanser, and dry one with a clean, soft rag. Place in this crock: *A*—Distilled water, 3 fluid ounces; hard gelatine (A. G. Co.), 1 ounce (av.); citric acid “crystals,” 10 grains; ammonium chloride, 35 grains. Allow this to soak for half an hour, turning the gelatine over occasionally with a glass rod, so that the mass will be thoroughly permeated with the saline solution. Place the crock, as before, in a larger vessel or pan containing water freely circulating under and around the crock, and bring this to a boil, stirring the contents of the crock occasionally until it forms a uniformly viscous mixture, when it may be carried into the darkroom.

Have ready at hand, previously prepared, the following silver solution: *B*—Distilled water, 2 fluid ounces; nitrate of silver, recrystallized, 63 grains. Under the safe orange light, add this solution (*B*) a little at a time to the gelatine solution (*A*), stirring the

mixture vigorously during this addition with a clean pine stick. Now add $\frac{1}{2}$ ounce of grain alcohol, with stirring. Having secured a complete emulsification of the ingredients, place the lid on the crock and cover the top thoroughly with a double thickness of stout brown paper, tying it with string under the rim of the crock. Set the crock aside in an ice-box or other cool place, where the emulsion will cool and set as quickly as possible.

Washing and Draining the Emulsion. As soon as the emulsion has sufficiently set, it is cut up and squeezed through canvas, as already described, into the second crock which may be half-filled with ice-cold water. Use distilled water, made as cold as possible with ice, for all washings of chloride papers. This completed, fold the canvas over the open top of the crock, tie it securely with string, and invert the crock to drain away the water carrying the salts of decomposition. Again half fill the crock with ice-cold distilled water and shake it gently to ensure thorough washing of the shredded emulsion. After a few minutes, invert the crock and drain off as before. Five such washings will be sufficient. The final draining after the last washing should be continued for an hour, so that all possible excess of water may be drained away.

Remove the canvas covering from the crock, shaking off any adhering shreds of emulsion into the crock; replace the stoneware lid and tie on the brown paper cover. Place the crock in the larger vessel of hot water and heat to a temperature of 200° Fahr. Now take hold of the crock with both hands, protected by a thick cloth, and shake or swirl it around lightly to aid in getting a thorough solution and admixture of the emulsion. Remove the lid of the crock and stir in half an ounce of grain alcohol.

Filtering and Coating. The emulsion may now be filtered, as already described for bromide emulsions, and the coating of paper begun when the temperature of the hot, filtered emulsion reaches 90° or 80° Fahr. If the room is cold, as in winter, coating may be begun with the emulsion at 100° Fahr., as it cools and thickens as the temperature is lowered.

Formula No. 2. A more rapid emulsion giving a softer image, corresponding to the "special" grades of commercial papers, may be prepared with the following formula: *A*—Distilled water, $4\frac{1}{2}$ fluid ounces; hard gelatine, $1\frac{1}{2}$ ounces (av.); citric acid "crystals," 30 grains; ammonium chloride (c.p.), 60 grains. Treat this as advised for *A*, Formula No. 1. As soon as the mixture is thoroughly liquid and well melted, proceed under a safe light, as before, to add the following silver solution (*B*), stirring well with a clean pine stick during the addition. *B*—Distilled water, 3 fluid ounces; nitrate of silver, recrystallized, 90 grains. Measure into the graduate in which the silver solution was made 1 ounce of pure grain alcohol and add this, with vigorous stirring, to the contents of the crock. Now place this crock in a second larger crock of 1 or $1\frac{1}{2}$ gallons' capacity, filled about two-thirds full of cold water, covering both crocks carefully. Set the crocks aside on a board floor, so that the setting of the emulsion may take place slowly. In the course of twenty-four hours or so, the emulsion will be sufficiently set for washing.

The washing, draining, etc., of the emulsion may now be proceeded with as advised for Formula No. 1. When the remelting of the emulsion is complete, add $1\frac{1}{2}$ fluid ounces of grain alcohol, stirring during this addition, and let the temperature of the emulsion fall to 90° or 80° Fahr. before coating the paper.

A Developer. Any M-Q paper developing formula may be used with the two papers just described, but I give the formula I have used, which gives me very pleasing prints: Distilled water, 24 ounces (fl.), sodium sulphite (dry), 150 grains; sodium carbonate (dry), 200 grains; metol (or Elon), 18 grains; hydroquinone, 60 grains; 10 per cent solution of potassium bromide, 15 to 30 drops. In warm weather the quantity of water may be increased to 28 ounces; from my experience I find 20 drops of bromide sufficient to keep the whites clear. After development is complete, dip the prints in the usual acid bath and fix them in an acid fixing bath. This last, in summer, may contain a moderate quantity of hardener to prevent softening of the film.

Formula No. 3: Chloro-Bromide Emulsion. The fol-

lowing formula has given me an exceptionally good paper for black-and-white reproduction work, photostat printing, the copying of printed matter, engravings, etc. The best results are obtained by using a baryta coated paper of not too heavy a grade, and the developer given on a preceding page (Kodolon or paramidophenol-hydrochloride being substituted for the metol mentioned in the formula) yields vigorous prints with deep blacks. It is an unwashed emulsion, but note the modification mentioned later as to this.

A: In a clean stoneware crock place: Distilled water, 4 fluid ounces; ammonium chloride (c.p.), 32 grains; potassium bromide, 40 grains; citric acid crystals, 60 grains; hard gelatine (A. G. Co.), 240 grains. *B*: Distilled water, 3 fluid ounces; nitrate of silver, recrystallized, 120 grains. Let *A* soak for half an hour and melt as advised for the preceding emulsions. Mix *B* in a glass flask and heat to 140° Fahr. Under ruby light, add *B* to *A*, with half an ounce of pure alcohol, stirring well with a clean white pine stick to obtain a thoroughly smooth mixture of all the ingredients and emulsify for 20 minutes at 150° Fahr.

Heat the emulsion at 140° Fahr. for half an hour (not longer) and set the crock aside to cool as quickly as possible by placing it in a larger crock containing ice-water, which should be changed frequently. When the emulsion has become well set, let it stand for twenty-four hours, thoroughly protected from light. At the end of this period it is melted as before advised, 1 ounce of grain alcohol added with stirring, and filtered, after which it is ready for coating—in a safe ruby light.

In several recent experiences I have found that a mixture of equal parts of this emulsion *washed and unwashed*, the mixture being made *after* filtration, gives a paper of greater rapidity with intense blacks and pure whites without any trace of veiling. An exposure of one second with a clear line negative and a 150-watt electric lamp is ample. In washing the emulsion as above given for this modification, only three washings and drainings should be given, and the wash-waters should be ice-cold. Also the jelly should not be allowed to set as firmly or become as hard as for the unwashed

emulsion, owing to the smaller quantity of gelatine employed in the formula.

If it is desired to harden any of these emulsions for coating, as well as in the case of bromide emulsions, the introduction of 1 drachm of formaldehyde in the alcohol added just before coating, will serve instead of the chrome alum mentioned. Thus, 1 drachm of formaldehyde is equivalent to 2 drachms of chrome alum solution where 5 grains of chrome alum per ounce of gelatine is advised.

GELATINE-BROMIDE EMULSION FOR CANVAS

A process occasionally called for is that for preparing sensitized canvas, linen, or similar fabrics for use in making enlargements, large prints for machinery salesmen, and similar trade purposes. As far as I know, no commercial article of this sort is available. The preparation of this bromide fabric is not difficult, and the formula here given can be relied upon to yield a satisfactory product, the point of vital importance being the treatment or preparation of the fabric selected for coating.

Preparing the Fabric. This, whether canvas, sheeting, linen, or other fabric, should first be well washed in several changes of hot water, to rid it of all the stiffening compound present in all commercial fabrics. After this, it must be carefully ironed out flat to secure an evenly smooth surface, without wavy irregularities or creases.

Any fabric coated with a gelatine emulsion will always present a slightly stiffened appearance, but will generally be sufficiently pliable for its use. To retain this pliability as far as possible, the amount of gelatine in the formula here given is reduced to a minimum.

If, however, a stiff fabric is desired, the material, after being thoroughly washed, may be soaked for a few minutes in a hot solution of starch and wrung out with the hands, this sizing operation being repeated

several times until the fabric is completely and uniformly impregnated with the sizing. It is then laid out flat on a clean cloth or ironing table and ironed smooth with a warm, clean-faced flat iron, after which it is suspended on a line so as to dry as flat and evenly as is possible. The starch sizing used must be a pure semi-transparent, semi-fluid starch mixture, without borax, wax, or other materials used by laundries to give gloss.

Formula. The emulsion as here given need not be washed, but is ready for coating as soon as melted and filtered. If greater rapidity is desired, this can be obtained simply by allowing the emulsion to stand, after it has become set, for from twenty-four to forty-eight hours, during which time it will ripen and become more sensitive. All the details of preparation are as for the bromide emulsions already given.

In a clean stoneware crock place: *A*—Distilled water, 5 fluid ounces; hard gelatine (A. G. Co.), 1 ounce (av.); ammonium bromide, 225 grains; liq. ammonia .880, 1½ drachms; pure grain alcohol, 1 fluid ounce. Let this soak for half an hour, then melt in a water bath as before at 140° Fahr., stirring occasionally with a glass rod. *B*—Dissolve nitrate of silver, 300 grains, in distilled water, 5 fluid ounces, and, when dissolved, stir in 1 ounce (fl.) of pure alcohol. Heat *B* to 140° Fahr. and, under deep ruby light, add to the bromised gelatine solution *A*, a little at a time, with constant stirring with a clean pine stick. Cover the crock with its lid and heat in a water bath, as before, to 140° Fahr., keeping it at this heat for three hours, with occasional stirring.

At the end of three hours add 100 grains of hard gelatine, keeping the temperature at 140° Fahr., and stirring with the pine stick to secure complete solution and admixture of the added gelatine. Lower the temperature to 90° Fahr. and add 1 fluid ounce of pure alcohol. Filter the emulsion while hot and proceed to coat the fabric as follows:

Coating the Fabric. Take a sheet of clean, stiff white cardboard of suitable size, lay the fabric on this, smooth side up, and clip the ends of the fabric back over the cardboard with wooden photographic clips. In this way

it may be stretched perfectly flat and smooth upon a semi-flexible base for coating. Prepare as many pieces of fabric in this way as the emulsion at hand will coat.

Using a 2-inch camel's-hair brush set in rubber, dip this into the hot emulsion and quickly apply it in even strokes to the whole face of the fabric. Now bend the fabric on its flexible base, so that it forms a broad U, with the canvas or fabric on the convex side, and pass the whole sheet progressively over the emulsion in the coating trough, as described for the coating of paper. As soon as the excess of emulsion has drained away, suspend the fabric, still attached to its cardboard support, on a line in the drying room by means of wooden clips. When dry, it is stripped from its support and rolled on a large cardboard tube, previously covered with several layers of hard-glazed waterproof paper, and stored away for use.

The exposure and development of fabric so sensitized does not differ from that employed in the use of a bromide paper of moderate rapidity. Metol-hydroquinone is a very suitable developer, and an acid fixing bath is advised.

In the above emulsion process the picture image is held upon the surface of the fabric by the thin coating of gelatine emulsion. If it is desired to prepare sensitized canvas or linen so that the image will be in as well as on the fabric employed, the following method may be followed.

Serum of Milk Process. Prints on linen or fabric made by this method may be washed and ironed as often as desired. The fabrics used are supposed to have been prepared or treated as outlined in the preceding process.

Preparing Serum of Milk. Take a quart of milk, allow it to stand until all the cream has formed, separate the cream by careful skimming and add 1 ounce of acetic acid to the milk; stir this well and allow to stand for twenty-four hours, when the curd will separate from the serum or clear liquid remaining. Now filter this clear liquid or serum into a clean bottle, by pressing a tuft of absorbent cotton (which has been wetted and wrung out) loosely into the neck of the glass funnel

used for filtering. This will eliminate every trace of cream or organic matter from the serum which is now ready for use.

The Salting Solution. Grind 60 grains of potassium iodide and 30 grains of potassium bromide in a glass or stoneware mortar with 2 ounces of the serum, and, when smoothly dissolved, add to this 4 ounces of serum. Filter this mixture and the salting solution is ready for use.

Salting the Fabric. Stretch the fabric on cardboard, as already advised, and coat it thoroughly by means of a rubber-set flat brush, or a cotton swab made by tying a piece of canton flannel over the end of a 4 x 5 plate, so that the whole of the fabric is well saturated with the salting mixture. Suspend the salted fabric in a warm place to dry, away from all dust. Fabric so salted will keep in good condition for months if stored in a dry place, rolled smoothly on a large cardboard tube protected with glazed, waterproof paper.

Sensitizing the Fabric. When it is desired to make an enlargement on fabric so prepared, a sensitizing solution is made up as follows: Distilled water, 100 fluid ounces; nitrate of silver, 300 grains; glacial acetic acid, $\frac{1}{2}$ ounce (fl.).

The fabric is now sensitized by brushing this solution thoroughly into the material, keeping the surface well wetted with the sensitizer for at least three minutes, and draining off any excess of sensitizer from one corner—the sensitizing being done in a large, shallow enamel-ware tray in which the fabric is laid as flat as possible. After sensitizing, the fabric is suspended in a darkroom until it is *surface dry only*.

Exposure and Development. The enlargement in hand having been previously focused, the surface-dry sensitized canvas is fixed in place on the enlarging-board by means of push-pins, the cap removed from the lens, and the exposure made. As soon as the shadows of the subject are fairly shown in the enlargement, remove the canvas from the enlarging board and lay it, face up, in a clean tray. The developer, which is previously prepared, is now poured over the surface of the enlargement in the tray. To prepare the developer,

dissolve: Gallic acid, 192 grains; acetate of lead, 96 grains; and glacial acetic acid, $1\frac{1}{2}$ fluid ounces, in water, 20 ounces.

Rock the tray during development, holding the fabric down loosely with the tips of the fingers at one end of the tray. As soon as the image is fully developed, the developer is poured off (into a "waste" crock if it is desired to save the silver), and the print is well washed in running water for a few minutes.

Fixing. Dissolve hyposulphite of soda, 8 ounces (av.) in water, 40 ounces. After complete solution is obtained, add to this 2 grains chloride of gold. In this solution the well-washed print is now immersed and kept in motion for about ten minutes, which will suffice for its thorough fixation. The use of the chloride of gold here advised gives a clear, jet-black image; if a plain hypo bath is employed the developed print will have a tinge of brown or warm black. If this is desired, omit the chloride of gold from the fixing bath. After fixing, the print is well washed in running water for an hour, with frequent hand wringing to expel the fixing salts. Finally, suspend to dry and iron the print flat and smooth on an ordinary ironing-board.

PREPARING A STRIPPING (TRANSFER) PAPER

With any of the development paper emulsions herein described, a very good stripping or transfer paper may be made, giving prints which may be stripped from the original base and transferred to other special papers, wood, metal, or other surfaces plane or curved.

Any good base paper is suitable for this process, thin drawing-papers being best adapted where the transfer is to be to a curved final support, and thicker drawing-papers where a flat or plane-surfaced final support is to be used. If the base paper chosen has a matt or grained surface, this surface quality or impression will remain in the print after transfer.

Primary Gelatine Coating. The first step is to give

the base paper a foundation for the emulsion coating, which will permit the stripping of the print in warm water. Prepare the following solution: Water, 12 fluid ounces; soft gelatine, 200 grains; granulated sugar, 90 grains. Allow the gelatine to soak in the water for a short time, then add the sugar. Place the vessel containing this mixture in a larger pan of hot water and bring the water in the outer vessel to a boil, stirring the mixture well so as to get a smooth solution. Strain the solution through fine muslin after adding 1 ounce of pure alcohol. Lower the temperature to 90° Fahr. and proceed to coat the paper selected in the manner described for coating with emulsions on preceding pages. As each sheet is coated, suspend it to dry in a warm, dry room or closet. When dry, roll the gelatinized sheets, face out, on a large cardboard tube and keep it in this way until ready for the second step in the process—the waxing.

Waxing the Paper. Prepare the following solution: Spirits of turpentine, 6 ounces (fl.); benzine, 6 ounces (fl.); beeswax, 40 grains; yellow resin, 100 grains. Obviously this is a very inflammable mixture and must be kept well away from any flame. Melt the resin and beeswax in a small enameled iron saucepan. Remove it from the heat source and away from any flame, and pour the hot mixture into another vessel containing the turpentine and benzine, after which bottle the mixture for use. When this solution has become cold, shake it well before using it. To wax the paper, lay one of the gelatinized sheets, face up, on a clean table, pour a small quantity of the waxing solution upon a pad of canton flannel, and rub this over the gelatinized surface of the paper. Lay this sheet aside and deal with the other gelatinized sheets in the same way. Now, beginning with the first sheet waxed, go over all the coated sheets again with another clean pad of flannel, until only a slight stickiness or clinging action is felt, when a third clean pad of flannel must be used and all the sheets again rubbed lightly. The object here is to give each sheet of gelatinized paper a very thin film of wax—just sufficient everywhere to prevent the emulsion coating later to be applied from adhering to the

primary gelatine coating. As an alternative to this waxing process, the coating of the sheets of gelatinized paper with a thin, diluted plain collodion is equally satisfactory, but the waxing process is simpler and less expensive.

Coating with Emulsion. The emulsion perhaps best suited for this purpose is the washed chloride emulsion No. 1 given under Development (Gaslight) Emulsions. When ready for coating a batch of paper prepared as above, bring the emulsion to a temperature of 90° Fahr. and add, with stirring, 1 drachm of formaldehyde for each 8 or 10 ounces of emulsion used. The coating of the paper is done exactly as described under the Bromide Paper Process already given, and, of course, in a safe orange light. When the coated paper is thoroughly dry, roll the sheets, face outward, upon a large cardboard tube. Just before use, re-roll the sheets face inward to get the curl out of the paper for more convenient handling. A better way of handling these sensitive papers is to cut the sheets to the sizes desired as soon as dry, pack in black needle-paper, and place under light pressure in a printing frame until needed for use.

Printing Stripping Papers. The printing with this class of papers does not differ from that employed in everyday work, but the fixing of the prints calls for the following fixing solution, which will give the fixed print a somewhat "sticky" surface. The transfer must be made as soon as the fixing is complete, the print being almost surface dry at this stage. Fixing solution: Water, 50 fluid ounces; hyposulphite of soda, 8 ounces (av.); sodium sulphite (dry), 2 drachms; citric acid "crystals," 90 grains. This bath may be prepared previously and ready at hand when required. As soon as the prints are fixed, which may take 10 minutes, remove them to a clean tray and wash for 20 minutes.

Now, having ready at hand the paper or other article to which the print is to be transferred, lay one of the prints, face upward, in a clean tray and incline the tray so that all the surface water will drain away from the print. This will give a nearly surface-dry print, such as is required for transfer.

Take the print between fingers and thumbs of both

hands, holding it by the ends, so as to form the letter U with the image on the lower side. Now place it carefully down on the paper or article to which it is to be transferred, so that the bend first touches the final support, and gradually lowering the ends of the sheet until the whole print is in contact with the face of the final support. Place on this a sheet of thin rubber, just as in making a carbon transfer, and apply a soft squeegee to the back of the print, from the center outward to the edges, until the print is completely in contact with the final support at every point without air-bubbles. The sheet of paper or article to which the print has been transferred is now allowed to stand under light pressure until perfectly dry. It is then placed in a water bath heated to about 150° Fahr. where, in a few minutes, the primary gelatinized paper may readily be removed by a gentle sliding motion, leaving the picture image firmly and evenly transferred. The face of the image is now washed in cold water and dried.

A Collodion Stripping Emulsion. If the reader prefers, the gelatinized paper, prepared as described, may be coated with a collodion print-out emulsion made up as follows.

First prepare the collodion: Pyroxylin (gun cotton), 47 grains; pure photographic alcohol, 3 ounces; sulphuric ether, 5 ounces. This mixture must be shaken up well to dissolve the pyroxylin. Label this bottle "Stock Collodion." About half a dozen amber glass bottles will be required, well cleaned out, and fitted with clean corks, and dried. Now prepare the following solutions: No. 1—Nitrate of silver (c.p.), 240 grains; distilled water, 4 drachms. No. 2—Chloride of strontium, 128 grains; pure photographic alcohol, 4 ounces. No. 3—Citric acid (powdered), 128 grains; pure alcohol 4 ounces. See that all the ingredients of the above solutions are completely dissolved. Now take a separate clean bottle; pour into it 4 ounces of the stock collodion; add 60 drops of solution No. 1 to 2 drachms of alcohol. Shake this well and add to the collodion; shake this mixture well, then add 2 drachms of No. 2; shake this vigorously and add, finally, 1 drachm of No. 3. After shaking the mixture well once more, allow it to stand

for half an hour, when it will be ready for use. All these operations must be done away from actinic light; they may be carried on under the light of an oil-lamp or gas-jet. Take one of the sheets of gelatinized paper; fold the sides and ends up for about $\frac{1}{4}$ inch all around; make a lip at opposite corners of the sheet; place this upon a piece of cardboard and hold it in position with just a touch of sealing wax. Filter the collodion emulsion into another amber bottle by pressing a tuft of absorbent cotton into the neck of a small glass funnel; when filtered, take the cardboard supporting the paper in one hand, pour a pool of the emulsion in the center, flow all around, then return to the funnel to be filtered again, pouring from one of the folded corners. Suspend the coated paper to dry, which quickly takes place; then recoat with the same emulsion, only pour off from the opposite corner; this will give an even surface. Dry again, when the paper is ready for use.

Printing. Cut the paper up into the sizes required; place the paper upon the negative just the same as in ordinary printing; make the print about the same in depth as an ordinary silver print; wash it about twice in clean water, then tone in a borax bath made up as follows: Saturated solution of borax, 2 ounces; solution chloride gold (1 grain chloride gold to 1 ounce water), 2 drachms; water, 8 ounces. Toning will be complete in from 3 to 5 minutes. The print can be handled with a pair of tongs, at the corner. Wash in a small tray of cold water, then fix in a clean solution of hyposulphite of soda as follows: Hyposulphite of soda, $1\frac{1}{2}$ ounces; water, 10 ounces. The print will be fixed in five minutes. Wash it well for a quarter of an hour after fixing, by several changes of water; it may now be blotted and cut to the size and shape required for the final support or object to which it is to be transferred.

Transferring the Print. Let us suppose that it is desired to transfer the print to a watch-dial. Place the print into a basin of clean, warm water; in a very short time the film will become removed. Lift it with a clean camel's-hair brush; lay it down upon the place required and carefully stroke it into position with the brush, and wipe out the excess of moisture by the same means. As

soon as it is dry it can be varnished with amyl acetate collodion and dried. The whole dial may be coated; no harm will come of it, as the varnish is quite invisible when dry. If it is desired to transfer to *smooth* porcelain or opal glass, the operation will be just the same. Transfer can also be made to watch-case surfaces in the same way, there being just enough of the gelatinous mixture to enable the film to adhere to the metal or glass.

PREPARING GLASS PLATES FOR STRIPPING

The preparation of gelatine-emulsion plates for stripping is a comparatively simple matter to anyone who has mastered the coating of glass plates with emulsion, as described in the first process given in these pages, together with the method for preparing a stripping paper just given.

Cleaning the Plates. The first step is to thoroughly clean the glass plates to be used, according to the method given on page 441. They are then taken singly and each plate examined, so as to ascertain the concave side of the plate. This may easily be seen, although the concavity is extremely slight, by holding the plate edge-wise and viewing the surface along the edge while the plate is held in the hand between the eye and the light source. As thus examined, the plates are stored on their edges, standing on clean, lintless paper, with their convex sides to the front of the pile, so that when the plates are removed the face to be treated (waxed) will be uppermost, viz., the concave side.

Waxing the Plates. The waxing solution given for stripping paper is quite suitable for use with plates. Take the plates one by one and wax the concave side of each, just as described for waxing paper in the preceding method. As they are waxed, lay the plates aside, coated face uppermost, for the solvents to evaporate from the coating. Then give each plate successive rubbings with canton flannel as before described.

Collodionizing the Plates. As soon as all the plates in hand have been waxed and prepared as above, coat them with plain collodion in the same manner as for coating with emulsion, allowing the excess of collodion to drain off the plate into the bottle it was poured from.

Place the collodionized plates, as coated, in a rack to dry, so placing them that the collodionized surfaces face in the same direction so that this may readily be recognized when they are to be coated with emulsion.

Coating the Plates with Emulsion. The lantern-slide plate emulsion given on an earlier page is very suitable for the making of stripping plates. As soon as the collodionized plates are dry, they may be coated with the emulsion precisely as directed for coating gelatine-bromide plates. A little more care will be needed here as the collodion surface of the plates will be slightly repellant. Let the emulsion flow more slowly and allow a little more time to the coating to overcome this slight repellant action. The excess of emulsion, after evenly coating each plate, is poured or drained from the lower right-hand corner of the plate into the graduate used in coating, and the plates are set away to dry just as described for other emulsion coated plates.

Stripping. After exposure and development in the usual way, the film is stripped by first cutting a clean line $\frac{1}{8}$ inch from the outside edges of the plate with a thin, sharp knife or razor-blade, and lifting the film from one corner with a gentle, steady movement. Another method of stripping the film is to place the plate in water so as to slightly soften the film, then place it in a tray containing half an ounce of water ammonia to each eight ounces of water for about half a minute. A piece of wetted muslin or silk is now carefully spread over the surface of the plate, and a piece of thin, white rubber sheeting over the top. Apply a flat, soft squeegee and get the silk or muslin thoroughly adhering to the plate. Now remove the rubber sheeting and set the plate with its silk or muslin covering horizontally to dry. When thoroughly dry, cut a clean line through the silk or muslin and the film, all around the edges of the plate as already described, and the film may be stripped by lifting one corner and gently remov-

ing the whole film and its backing—which latter is separated from the film in a water bath without difficulty.

This method is well adapted to the production of transparencies to be transferred to other final supports, and such transparencies may be colored before stripping if desired.

Stripping plates so prepared are very delicate as to surface and should be packed face to face, with cardboard separations, as dry plates are packed, to protect the delicate surfaces from grit or scratches.

A Protective Matt Varnish. Transparencies produced by this method, colored or plain, may be given a matt, waterproof varnish equal to the finest ground-glass in the following varnish. Grind in a stoneware mortar: Oxide of zinc (Venetian or French), 120 grains, and amyl acetate, 3 fluid ounces; add 4 fluid ounces of amyl acetate collodion and grind all three together. Pass this mixture through a plug of absorbent cotton pressed lightly into the neck of a tin or enamel-ware funnel filter, into a clean glass bottle. This varnish is poured upon the glass transparency just as described for coating plates.

ALFRED J. JARMAN.

BOOKS

MODERN DRY PLATES OR EMULSION PHOTOGRAPHY. By Dr. J. M. Eder. Translated and edited by H. Baden Pritchard. 138 pp. New York. 1881. (Out of print and difficult to obtain; copies may be seen at some of the larger public libraries.)

PHOTOGRAPHY WITH EMULSIONS. A Treatise on the Theory and Practical Working of Gelatine and Collodion Emulsion Processes. By Captain W. deW. Abney, R. E. 192 pp. New York. 1886. (Out of print, but a few copies may be had at the store of the New York Camera Exchange, 114 Fulton Street, New York. Price \$1.50.)

See, also: "The American Annual, 1920" for a good lantern-slide plate emulsion, by G. T. Harris, at page 176. In the same "Annual" for 1919, at page 20, J. I. Crabtree gives some valuable hints on fog.

Notes and Comment

GOERZ LENSES. The German ownership of the C. P. Goerz American Optical Co., consisting of 549 shares out of a total of 600 shares, together with its photographic patents, trade names, and concessions, has been sold to a group of Boston financiers. The business of the company will be continued with renewed activity under the management of Mr. Fred Schmid, who has been connected with the management for the past twenty years. The force of skilled optical workers and experts gathered under Mr. Schmid's leadership are retained by the new company, the office and factory being continued at the old address, 317 East 34th Street, New York City.

MR. G. C. CROWTHER, formerly of Kobe, Japan, now permanently residing in London, gave a demonstration and lecture on "Artificial Light Portraiture" before the Royal Photographic Society during April. His paper is reported in the April issue of the Society's *Journal*, the price of which has been advanced to 2/6 (60 cents) per issue.

PHOTOGRAPHY AND THE PRINTING ART. At the annual meeting of the Clarence H. White School Alumni, held at New York City a few weeks ago, Mr. Stephen H. Horgan gave an interesting lecture on this subject, illustrating his remarks with numerous specimens of the reproduction methods discussed. Among these was a precious volume containing several issues of "The Pencil of Nature," illustrated with twenty-four Calotype photographs, published by Fox Talbot 1844-46.

THE HEYDE AKTINO METER is again on the market, but the 1920 model has an American speed dial and other important improvements over the earlier meter. The Herbert & Huesgen Co., New York City, has the sole American agency for this new model and will gladly send a booklet on request. Those purchasing the Heyde meter through dealers are advised to insist on the 1920 model, having the American dial.

DR. C. E. KENNETH MEES, of the Eastman Research Laboratory, at present on a European trip, gave a lecture before the Royal Photographic Society, May 4, on "The Theory of Tone Reproduction," in the preparation of which Mr. Lloyd A. Jones had joined forces with the lecturer.

REPRINTS. New editions of THE PHOTO-MINIATURE, Nos. 142, 151, 173, and 174, are in press and will be ready in June. No. 142 deals with "Profitable Photographic Processes," including photographs on watch-dials, caps, spoons, and similar articles; prints and enlargements on silk and fabrics; minute photographs for charms and novelties; pseudo enamels and similar methods not available elsewhere. No. 151 is the only handbook available to "Photography with Reflex Cameras and Focal Plane Shutters." No. 173 is the Second Series of "Figures, Facts and Formulas of Photography," and No. 174 is a complete guide to modern methods of "Home and Garden Portraiture." Price 40 cents each.

CRAMER'S HI-SPEED PLATES. The demand for these remarkable plates, recently introduced by the G. Cramer Dry Plate Co., St. Louis, Mo., has for months past exceeded the supply, and the manufacturers have increased their facilities to meet the greatly increased business.

Books and Prints

THE SYSTEMATIC DEVELOPMENT OF X-RAY PLATES AND FILMS. By Lehman Wendell, B.S., D.D.S. 78 pp. illus. \$2. St. Louis: C. V. Mosby Co. 1919.

This is a very practical handbook for the radiographer in surgery and dentistry, giving the author's methods and formulas, with a wealth of illustration. I know of no other book in this field so complete and satisfying.

THE AMERICAN ANNUAL OF PHOTOGRAPHY, 1920. Volume XXXIV. Edited by Percy Y. Howe. 295 pp., profusely illustrated. Paper Covers, \$1.50. New York: George Murphy, Inc., General Sales Agents.

Diversity of interest is the keynote of the "Annual" this year, plainly demonstrated by my inability to put the book down, after glancing over the Table of Contents on page 4, until I reached page 295. The subjects dealt with cover a wide range: the production of (bichromated gelatine) relief images, Dorétypes, the camera and the microscope, stereoscopy, nature photography, the advantages of the pinhole, seashore and surf photography, nature-work, home-made apparatus for various purposes and the like. Not always do the titles of the articles reveal all that the reader will find in the articles themselves. Thus under "A Plea for the Single Lantern" G. T. Harris gives instructions and formulæ for a thoroughly good lantern-slide plate emulsion.

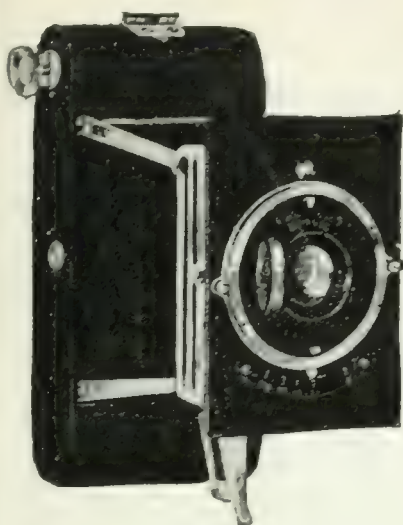
The illustrations hardly equal the text in quality or interest, but there are notable exceptions, as, for instance, the examples of pictorial composition by A. B. Hargett, Edward R. Dickson, Rudolph Eickemeyer, Louis J. Steele, and most of the portraits reproduced.

THE FINE ART OF PHOTOGRAPHY. By Paul L. Anderson. 315 pp; illustrated. Price \$3. 1919. Philadelphia: J. B. Lippincott & Co.

"The aim of this book," according to the publishers' blurb on its outer cover, "is to point out the underlying principles of *art* in so far as they are applicable to photography, and to encourage the student of the subject to apply these principles in his own work." Its contents are divided into thirteen chapters entitled: Introductory; Composition; Values; Suggestion and Mystery; Landscape Work; Winter Work; Landscape with Figures, Figures in Landscape, Genre; Illustration; Architectural Work; Marine Work; Motion Picture Work; Portraiture; The Philosophy of the Hand Camera; Conclusion.

THE CONDENSED CHEMICAL DICTIONARY. Compiled by F. M. Turner and others. 525 pp. Cloth \$5. 1919. The Chemical Catalog Co., New York.

In this dictionary we have a very successful attempt to compress into a single volume, of convenient size, all the essential data and information regarding chemicals and other substances used in everyday manufacturing and laboratory work, to which the average man may desire quick access for reference. In the compilation of the information given and its arrangement, the editors have labored for the helping of dealers, importers, shippers, and non-technical workers generally, rather than for the scientific or trained chemist. Thus, in addition to the technical data concerning the product described in any given instance, each entry includes a description of the usual containers in which the product is packed, the classification of the substance by fire-insurance companies, and the U. S. railroad shipping regulations governing its transportation. Many useful tables are included at the end of the dictionary proper, and altogether the book may be summed up as the most useful addition to chemical literature published within recent years. Certainly it is the one book which should be found on the workroom bookshelf of every photographer.



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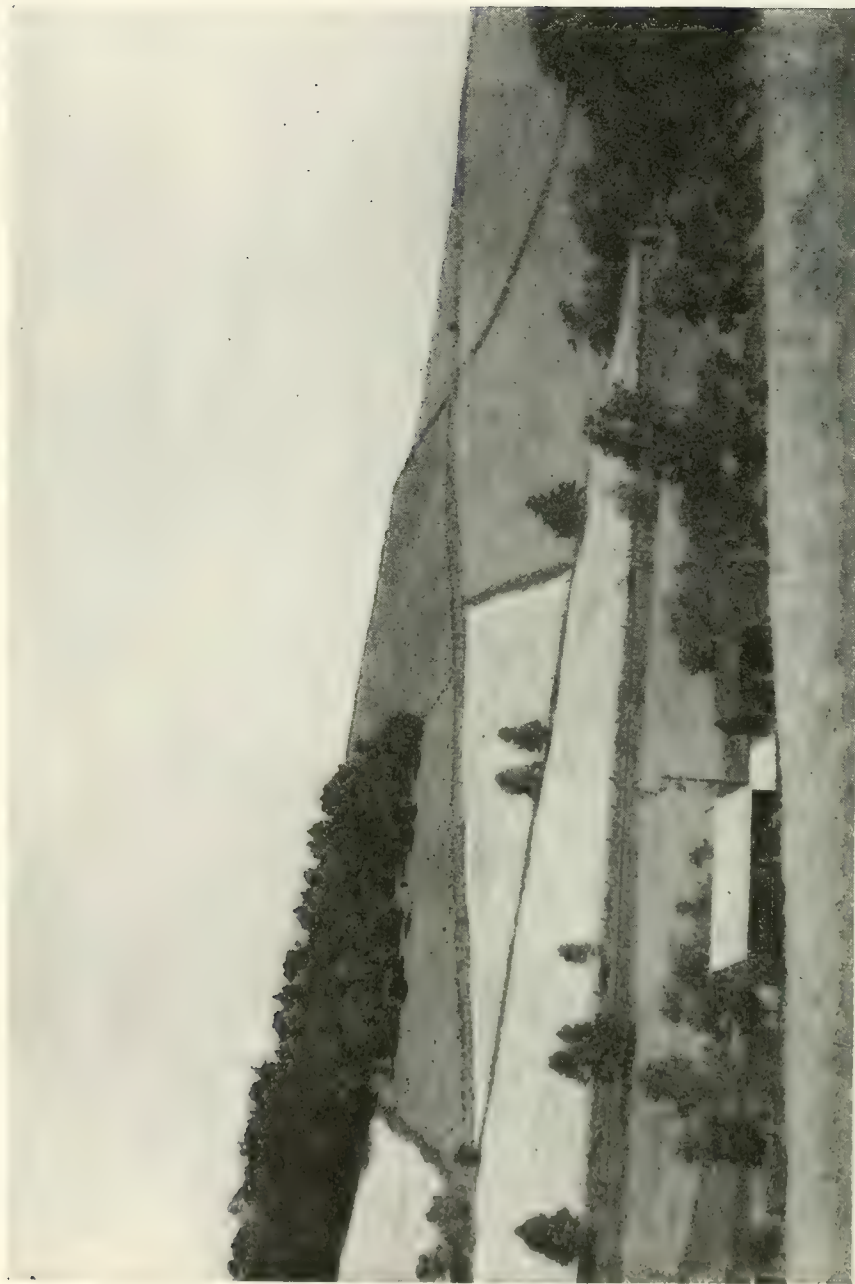
A V. P. Kodak "snapshot" on Riverside Drive, New York
By YOSEI AMEMIYA



Reproduction of a gum-bichromate enlargement from a hand camera
negative $1\frac{5}{8} \times 2\frac{1}{2}$ inches

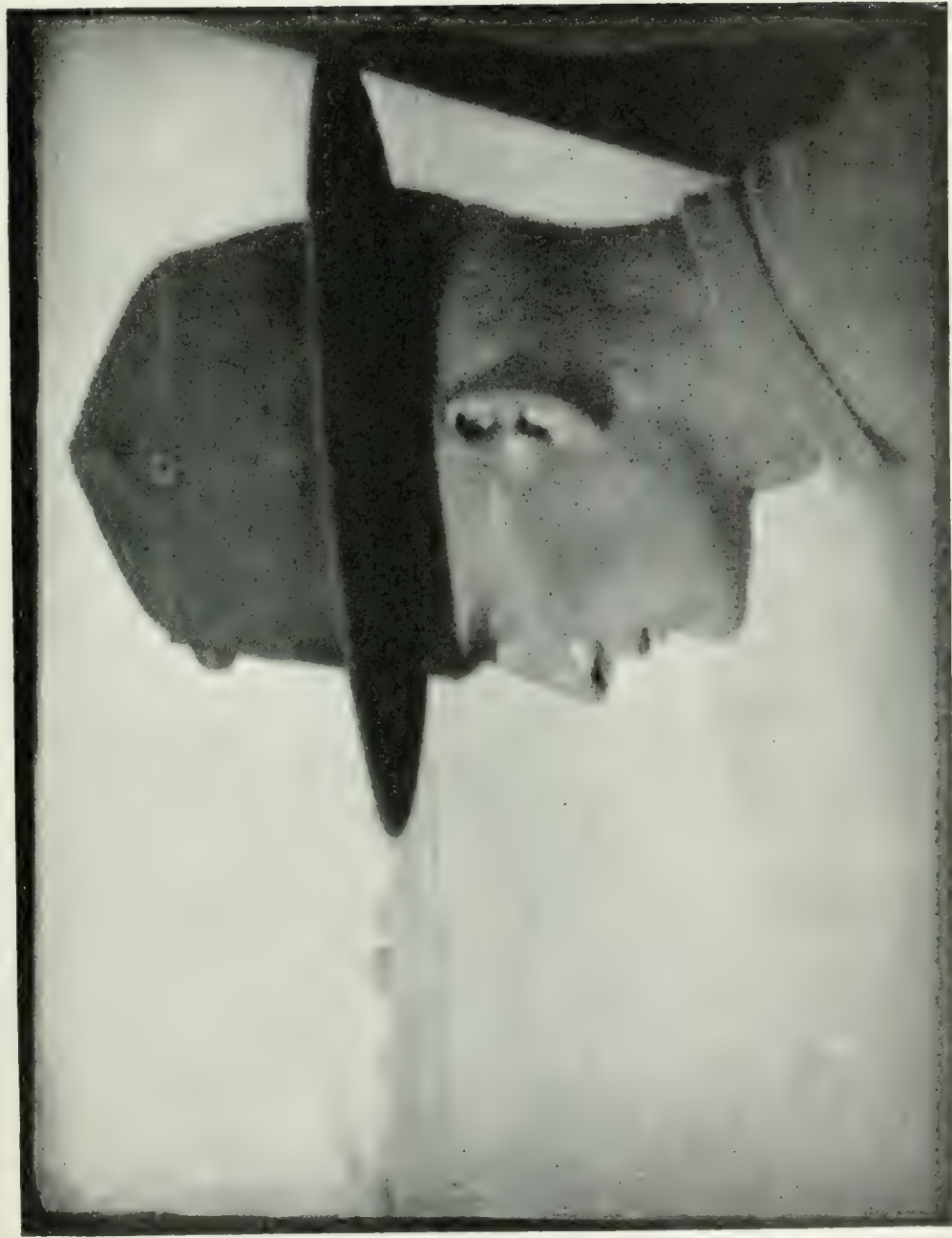
By ALBERT MEYER

From "Pictorial Photography in America, 1920"



SOLITUDE

By W. R. Latimer



WITH FACE SET TOWARDS THE WESTERN FRONT

By Lieut. Edward Larocque Tinker, U. S. N.

From "Pictorial Photography in America, 1920"



DOUARNENEZ, FINISTÈRE

By Dr. A. D. Chaffee

The Photo-Miniature

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Photography With a Hand Camera

A hand camera, as all the world knows, is a camera with which you, or "Jane, aged nine," can "take a picture" of anything you or Jane can see, anywhere and at any time (provided that the camera is "loaded with film")—just as you go, without bother or fuss. Then the dealer "finishes" the pictures and you have them—"a perfect twenty-four-hour service and no charge for failures." There, in a word, you have photography with a hand camera—as all the world knows, *per* advertisement. You say it is not so and you speak from experience. I say it is so—just as all the world knows. Surely you must have "slipped up" somewhere in your experience. There was an instruction book tagged to the camera when you bought it: a little book, with closely printed pages and all sorts of diagrams; but you did not bother about it. Of course not. It's all so simple with a hand camera nowadays—"photography with the bother left out"—and the dealer showed you how the camera operated. But you tell me that you did not get all the pictures "taken" on your first trip, and the dealer seemed to blame you, and not the camera, for all sorts of queer blunders as he explained why he could not "finish" more than three or four of the ten or twelve pictures most certainly "taken." Whereupon you returned home resolved to

look into the instruction book and "get down to brass tacks," since, evidently, photography with a hand camera was not as simple as you thought, but "something different again." And after a third careful reading you agreed with Jane that the instruction book "took far too much for granted," so that you called on the dealer for specific information as to this or that point, which he explained very patiently and at great length, camera in hand. During that interview it dawned upon you that photography with the hand camera involves a knowledge of photography as well as of the camera. This idea, as you remember, was enthusiastically endorsed by the dealer, and you carried home with you "The Fundamentals of Photography," by C. E. Kenneth Mees, D. Sc. In that delectable book, you tell me, you reveled for days, finding in it all manner of useful information and practical helps as to the lens on your camera, depth of focus, and other things before undreamed of. Applying this knowledge in your home-and-garden camera drill (Jane dropping out of the game when she saw "The Fundamentals"), you began to get results and the irresistible fascination of photography gripped you. It was plain, however, that the "pictures" had to be made, not "taken," and that your success or failure in this picture-making depended, not on the camera alone and unaided, but very largely on your skill in its use, combined with a sure knowledge of certain fundamentals.

Thereafter, working and reading, you perceived that photography with a hand camera apparently had fundamentals not included by Dr. Mees in his collection—exposure, for instance, and the getting of the "picture" on the film. As to these and other things, so obviously of vital importance, you wrote to the manufacturers of your camera, and they referred you to the editor of *THE PHOTO-MINIATURE*, who here puts into your hands the fundamentals of photography with a hand camera, as follows.

The Hand Camera. When our sturdy ancestors—the amateurs of the nineteen-seventies—went out into the country for a photographic week-end, they took

with them a veritable wagon-load of apparatus and impedimenta. Photography then depended on the use of wet collodion plates, prepared on the spot and calling for deliberate "exposures" with the camera firmly fixed to the head of a tripod stand as sturdy as the ancestors. The introduction of the gelatine dry plate of the early eighties banished the wet plate with all its impedimenta. It was quickly seen that the greater speed or rapidity of the dry plate permitted exposures so short that photographs of most subjects could be obtained with the camera held in the hands—which banished the cumbersome tripod and pointed the way to small cameras, of light weight and compact construction. Enter the hand camera, at first using rapid dry plates. As soon as the Eastman roll-film made its appearance, permitting the photographer to carry sensitive films sufficient for many pictures inside his camera (thus doing away with any necessity of carrying fragile but bulky and heavy glass dry plates and the "holders" in which these were carried and used), hand camera photography leaped forward to the world-wide popularity it now enjoys. Today, if we push the ubiquitous motion picture camera aside for the moment, we face the fact that more than seventy-five per cent of the world's photography is done with a hand camera—the invention of an American, George Eastman.

Evolution. The development of the hand camera has been wholly in the direction of greater portability, simplicity and convenience in use, coupled with a continual striving after certainty in results and a larger capacity and efficiency for different purposes. The tale cannot be told here. There are, let us say, nine hundred and ninety-nine varieties of hand cameras in the market: American, British, French and German. They are all different and yet all alike.

It is advisable to buy the first hand camera blindly, without asking questions or attempting to choose, stipulating only that it shall be simple in use and not expensive. The less you pay, the less you get—and elemental simplicity is the one thing most to be desired in the first hand camera. You, or Jane, as the case may be, will have less to bother about and puzzle over.

The least expensive camera you can buy will give you just as good "pictures" as the most expensive of cameras, if used within the limits of its capacity.

In these last five words you have all the significance of the differences between the \$1 camera and the \$100 camera. The price has nothing to do with the quality of the result. But it has everything to do with the range of capacity and efficiency of the camera for different classes of work; what it can do and what it cannot do; when you can use it and when it will be useless. This may be said to be the first fundamental of photography with the hand camera. As the camera increases in efficiency and range of capacity, the price increases proportionately.

Essentials. Every hand camera is essentially a light-proof box or chamber, with a lens at one end (the front) and a device for holding, and perhaps changing, the sensitive film or plate at the other end (the back). The vital thing about the camera is that it must be so constructed that no light can enter, and so reach the sensitive film, except through the lens. Add to these a mechanical device called an exposure shutter, to regulate or control the period of the exposure which gives the "picture;" a device called a "finder," which will tell us when the object we want to photograph is included within the limits of the film or plate used; and another device by which the separation or distance between lens and film is adjusted, so that the picture image will be properly defined or "focused" on the sensitive film, and you have the essentials of a hand camera.

All these essential parts or devices may be infinitely varied in design and efficiency, and there may be added other devices, called movements or adjustments, for the better regulation or control of the camera, or to increase its usefulness for different classes of work. These may be desirable, but they are not essential for everyday hand camera work and, if provided, necessarily add to the complexity and cost of the camera. Thus, in some hand cameras the "finding" and "focusing" devices are combined; in others the necessity for "focusing" is entirely eliminated, and so on.

Your Hand Camera. I do not know which one, among all these hundreds of varieties of hand cameras, you possess. It does not matter in the least. As I said: they are all different and yet all alike; different in form, equipment, capacities and price; alike in that all will give you good results if used within the limits of their capacities. The big fact for you to lay hold of is this, that what you can do with your hand camera and the quality of your results, depend chiefly upon your knowledge of and familiarity with your camera, its different parts or movements, what they are designed to do and how they do it. Which is to say, plainly, that you must know your camera—its capacities and limitations; what it can do and cannot do; when and where (under what conditions) it will give you a satisfactory picture, and when and where it will fail for lack of capacity or power.

Getting Wisdom. The purely mechanical knowledge of your camera and its manipulation can best be obtained by a careful study of the instruction book furnished by the manufacturer, made with the camera in hand. An occasional, cursory reading of the book is not sufficient. A modern hand camera priced at \$25 or more is an instrument of precision, designed to do many wonderful things and calling for nicety and intelligent skill in its operation. The more expensive the camera, the more complex its construction and the finer its adjustment. And the more impatient its owner to use it. Go slow. Take each separate part or movement. See what the book says about it and learn its handling by patient, persistent drill. The camera and its movements, the sensitive film before and after exposure, can be seriously damaged by mere clumsiness or carelessness in opening and closing the instrument. Familiarize yourself with the extension capacity and bellows movement; examine the focusing and finding devices again and again; look into the use of the "focusing lock," "range-finder," lens, exposure shutter, rising front, and other special attachments on your particular camera. Then get a practical knowledge of the significance of these movements by a careful reading of what is said about them, and the parts

they play in picture-making, as set forth in the following pages.

The Lens. Especially is it desirable to know all that can be known about the lens fitted to your camera. Lenses differ widely in power and capacity, and their cost increases with the increase in capacity. Technically they differ chiefly in focal length, speed or rapidity, defining power, and covering power. Let us see the significance of these differences in hand camera work.

Focal Length. This expresses the distance separating the lens and film when a distant object is sharply focused or defined on the film. It is usually given, in inches, among the specifications of a camera in the maker's catalogue. Its importance lies in the fact that (1) it has to do with the light-passing capacity of the lens, i. e. its ability to give a bright image; (2) it determines the scale or size in which an object at any given distance from the camera will be reproduced in the picture. The rule here is that the longer the focal length of a lens the larger will be the image obtained. Thus, if we photograph a sailboat 100 feet away from the end of a pier, with a lens of 6 inches focal length, and get an image of the boat 1 inch high, then a 12-inch lens would, from the same point, give an image of the boat 2 inches in height. (3) The focal length of the lens in relation to the base-line of the film or plate in use determines the angle of view or area of the field of view included in the picture. The longer the focal length of the lens, the narrower is the angle of view or amount of the subject included; the shorter the focal length, and the wider the angle of view or area of the subject included within the picture, the scale or size of the image of any object in the view being reduced at the same time. The general rule here is to use a lens the focal length of which is equal to the diagonal measurement of the plate or film in use: e. g., a lens of $4\frac{1}{4}$ inches focal length for a film $2\frac{1}{4} \times 3\frac{1}{4}$. A convenient diagram showing the angle of view included by lenses of varying focal length on plates or films of different sizes was given in THE PHOTO-MINIATURE, No. 76, and may be found in the lens catalogue of the Bausch & Lomb Optical Co.

Speed. The big question in hand camera work: Can I get a photograph of this or that here and now? is determined by the speed of the lens fitted to your camera. The greater the speed of your lens, the larger its usefulness for photographing different classes of subjects under difficult conditions of all sorts. Thus, a very rapid lens means extending the time of day or season of the year when you may photograph, and gives independence of unfavorable conditions such as bad weather, dull days, difficult subjects, etc. Hence speed is the vital difference between lenses from the hand camera viewpoint.

The speed or rapidity of a lens signifies its light passing capacity, i. e. the amount of light it can pass to the film or plate in a given time. It is this which determines the brightness of the image, upon which in turn depends the length of the exposure required to make the photograph. The speed of the lens is measured by the relationship between its focal length and the area of the lens surface, or aperture as it is called, by which light is admitted to the film or plate. All lenses are fitted with a series of apertures or "stops," in the form of an iris diaphragm operated by a lever, by which the size of the aperture (and amount of light admitted by the lens) are regulated at will. Thus the extreme speed or rapidity of a lens is expressed by the number or figure indicating its largest aperture or "stop." Sometimes these figures are marked on the lens barrel or tube, but generally on the exposure shutter fitted to the lens. Two different systems are used for the numbering of lens diaphragms and, as these are constantly used in calculating exposures, it is advisable to know something of them. In each system the numbers or figures express the ratio existing between the diameter or area of the apertures to the focal length of the lens.

"Stop" Values. In the first or so-called rational system the stops are marked by figures expressing in each case a fraction of the focal length of the lens, $f/4$ (or F4 as it may be written) meaning, for example, that the diameter of the aperture so marked is one-fourth of the focal length. Thus, in this system, we

have a series of apertures numbered: $f/4$, $f/4.5$, $f/5.6$, $f/6.3$, $f/7.7$, $f/8$, $f/11.3$, $f/22$, $f/32$, $f/45$.

In the other system, known as the Uniform System (U. S.), the lens apertures are so graded or arranged from the largest to the smallest, that each succeeding aperture has only half the area of that preceding it, thus admitting only half as much light in a given time, thereby halving the speed and calling for twice the exposure required by the next larger, or preceding stop. According to this system the lens apertures or stops are numbered 1, 2, 4, 8, 16, 32, 64, the aperture $f/4$ being taken as the unit and denominated U. S. 1. An advantage of this system is that the numbers are proportional to the exposures required by the different apertures. For example: if a subject requires an exposure of 1 second with stop U. S. No. 4 ($f/8$), then it will require 2 seconds with U. S. No. 8 ($f/11.3$) and 4 seconds with U. S. No. 16 ($f/16$). The subjoined table puts these facts in order for easier comprehension and use.

<i>F</i> /value	Nos. $f/4$	$f/4.5$	$f/5.6$	$f/6.3$	$f/7.7$	$f/8$	$f/11.3$	$f/16$	$f/22$	$f/32$	$f/45$
U. S. Nos...	1	..	2	4	8	16	32	64	128
Expos. Ratio	1	1.2	2	2.5	3.7	4	8	16	32	64	128

In some imported hand cameras the lens apertures vary from those given above. I give their comparative values for the convenience of users of such cameras, viz., $f/9$ (U. S. 5), $f/10$ (U. S. 6.25), $f/12$ (U. S. 9.2), $f/25$ (U. S. 39).

As we will see later the stop or lens aperture has other functions besides regulating the amount of light admitted, but the facts above given bear vitally on exposures.

Defining Power. This expresses the ability of the lens to give a sharply defined image over the whole of the film or plate, when used at its largest aperture. Any lens will give a crisply defined image of objects lying at the center of the field, but to extend this crisp definition to the edges of the film either the lens must be corrected for errors of definition, or we must reduce the area of the stop—which cuts down the speed or rapidity of the lens. Hence the better the definition given by a lens at its full or largest aperture, the finer

its correction or quality and the higher the price. In the simple meniscus lens fitted to the least expensive hand cameras we have this defining power at its minimum. In the anastigmat we have defining power at its maximum.

Covering Power. This is simply the ability of the lens to project on the sensitive film in the camera a circle of light or illumination sufficiently large to evenly illuminate the whole of the film from its center to its corners. Generally speaking, all modern lenses are satisfactory in this detail if used for the size of film or plate for which they are listed and sold. Where the "swing back" or "rising front" movements of the camera are much used, it is desirable that the "circle of illumination" given by the lens shall exceed the circle of definition i. e. the field of even illumination should be larger than the field of definition.

The Exposure Shutter. This is a device or attachment which regulates or controls the duration of the period during which light is admitted to the film by the lens—the time of exposure. In inexpensive hand cameras the shutter is often a metal plate, pierced with two or more apertures, which is thrown across the front of the lens by a spring or lever, this giving the exposure. In the better grades of cameras it has the form of an iris diaphragm placed between the elements of the lens which, in operation, opens from and closes to its center, being worked by air pressure or spring release. In reflecting mirror (Graflex) cameras the shutter takes the form of a spring actuated opaque curtain, having slits or openings across its full width, and operating immediately in front of the plate. This last form—the focal-plane shutter—stands first in efficiency; next comes the between-lens shutter, and last the simple shutter working in front of the lens. All shutters are marked by letters or figures indicating the different "speeds" or exposure periods they give. Thus T means "Time Exposure," B means "Bulb Exposure," I means "Instantaneous Exposure" and $\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{25}$, $\frac{1}{50}$, $\frac{1}{100}$, $\frac{1}{200}$, $\frac{1}{300}$, mean fractions of a second. In calculating the exposure required by any given subject, the result is expressed in one of

these "shutter speeds," and the shutter is "set" to work at that "speed" by adjusting a pointer over the speed number or figure on a scale or dial affixed to the shutter.

The efficiency of an exposure shutter depends upon its ability to open or uncover the lens aperture, allow it to remain fully open during the whole of the exposure period, and then close it—without any loss of time in opening and closing. Theoretically, the focal plane shutter, if fixed very close to the plate and using a wide slit or opening, approaches this maximum efficiency, since the full intensity of the lens is used during the whole of the exposure period. The diaphragm or between-lens shutter, opening gradually from its center and closing gradually from its full opening as soon as this is reached, cannot fulfil this efficiency condition, since a certain amount of the exposure period is occupied by the opening and closing operation, during which time the whole area of the lens aperture is not fully uncovered. Latterly, however, the iris diaphragm form has been replaced by a star-shaped opening of greater efficiency. This type of shutter permits of exposures ranging as high as 1-300th second, which provides for most of the subjects met with in everyday hand camera work even where these include fairly rapid movement. The speeds of focal-plane shutters range from 1-10th to 1-1500th of a second. In very cheap cameras only two "speeds" are available, i. e. "Time" and "Instantaneous," this latter usually meaning 1-25th second, and sufficiently rapid for subjects including slow movement if photographed in a bright light.

The vital points in an exposure shutter are (1) to get one which is accurately marked, i. e. will give exposures agreeing with the "speeds" marked on the shutter dial or scale, and (2) to be sure that the actual speeds of the shutter are not too quick or too slow for the rapidity of the lens. If the shutter is too quick, i. e. does not allow sufficient time for the required amount of light to pass through the lens aperture, the result will be under-exposure. If, on the other hand, the speeds are too slow, you may get movement in the

subject or over-exposure. At best, the "speeds" marked on the shutter are only approximate as indications of the actual speeds of the shutter. Thus, by repeated tests, it has been found that the 1-100th second of the average diaphragm shutter is generally 1-40th second; the 1-50th more nearly 1-25th second and the lower speeds usually quicker than they are marked.

Three Essential Operations. In making a picture with a hand camera, whether the result intended be a mere "snapshot," a technically perfect record, or a work of art, there are only three essential operations or things to be done. These are (1) "finding" or locating and arranging the subject on the film or plate; (2) "focusing" the picture image to ensure its proper definition or sharpness in the negative; and (3) giving the correct "exposure" required to reproduce in the print the appearance or form and light and shade effects of the subject.

The Formula for Success. If you will master these three essential operations, you can be sure of success in your hand camera photography. Until you have mastered them, there will always be a varying percentage of failure and waste. And your mastery of them depends wholly on your knowledge of your camera and familiarity with its use—regardless of its name, style, price, or nationality. Presuming that the camera is loaded with films or plate ready for use, a good picture (whatever that may mean to you) is bound to result if you point the camera at the subject, (1) "find" the particular part or arrangement of the subject desired on the "finder;" (2) "focus" the details of the subject to your satisfaction, and (3) give the sensitive film an approximately correct exposure. These, also, are fundamentals.

The Value of This Formula. Whether you will get in the negative just that view or arrangement of the subject, or the whole of the subject, as seen by the eye at the time of photographing depends on your knowledge and use of the "finding" device fitted to your camera. Whether the subject will be pleasingly defined or "focused" in the negative depends on your

knowledge and use of the "focusing" device with which your camera is equipped. Whether the "picture" will correctly or pleasingly reproduce the subject, as you saw it at the time of photographing, depends on your knowledge and use of the lens and shutter fitted to your camera which, together, control the "exposure" given to the sensitive film. As to this last—exposure—there is much to be learned, considered as the fundamental problem in all photography, apart from the use of lens and shutter in controlling any given exposure. But this, for the moment, lies outside of our formula. Let us now consider these vital factors in order and see what is involved in a practical knowledge and use of them.

"Finding" the Subject in hand camera photography simply means making sure that the subject we see and desire to record will fall within, or be properly arranged within, the limits of the plate or film used and so appear in the negative—all of the subject or detail desired and not part of it, arranged as to its parts and position in the negative as we saw it in our view of the subject.

In cameras before the hand camera came, as in view and other cameras even yet, this "finding" or locating of the subject was done by means of a ground-glass screen as large as the plate used, fitted to the back frame of the camera. As this screen occupied exactly the position later occupied by the sensitive film during exposure, it served for the "focusing" as well as the "finding" of the picture image, being spoken of as the focusing screen. Hand cameras designed for the use of plates, and the "plate attachments" offered with some roll-film cameras, are still provided with such a focusing screen which serves as the best sort of "finder." The modern roll-film hand camera, however, rarely has such a focusing screen or finder, reflecting mirror cameras such as the Graflex being an exception, wherein a full-size focusing screen and finder are combined, fitted in the top and not at the back of the camera. For this reason, i. e. lacking a focusing screen, hand cameras are fitted with a special device called the "finder," which tells at a glance just what view or part

of the subject falls within the boundaries of the film or plate and so will appear in the negative. It is obvious that with every change in the position of the camera, raising or lowering it, shifting from side to side, advancing towards or receding from the subject, the position and arrangement of the subject on the finder is changed, so that by the use of the finder we can control these things. We use the finder, therefore, to "find" or locate the subject so that it will surely fall within the limits of the film used, and to arrange its parts or principal objects so that these will appear in the negative in correct or pleasing position and relation to each other. When photographing moving objects, such as horse and rider going over a hedge, we use the finder to determine the precise moment for the exposure which will give us, in the negative, just the phase of action desired, opening the lens as we see the object in just the right position on the finder.

"Finders." There are less than half-a-dozen different finders, the form or type of the finder attached to any hand camera differing according to the fancy of the maker or the type of camera. Thus we have "box," "brilliant," direct-vision," and "focusing finders," all doing the same work in different ways and with varying efficiency.

Box Finders. This is the simplest and least efficient form of view finder, and is fitted to most "box cameras" and inexpensive hand cameras. It is practically a miniature camera, consisting of a little wooden or metal box, with a small lens at the front which projects the image of any object before it on to a tiny mirror placed at an angle behind it, which mirror in turn reflects the image upward on to a small square of ground glass placed horizontally in the top of the finder. This sort of finder is usually imbedded in the body of box cameras, or placed on the bed or baseboard of folding hand cameras, near the lens in either case. By looking at (not into) the ground-glass screen from a normal viewing distance, if the finder is reasonably correct in construction and adjustment to the lens fitted to the camera, we see a tiny picture image of the subject before the camera at the moment, and will (or should)

get in the negative just what we see included within the limits of the finder screen. The objections to this form of finder are that the picture image is very small and dim or difficult to see, and that they are often only approximately correct in adjustment to the lens of the camera.

Brilliant Finders. These are practically identical in principle with box finders, except that the box disappears and is replaced by a light metal frame, generally collapsible and reversible, and having a second lens placed above the little reflecting mirror instead of a ground-glass screen. Such finders are in fact miniature reflecting mirror cameras, and the picture image is seen with greater clearness or brilliancy, hence the name. This type of finder is usually fitted to the better grades of hand cameras, close to the lens, and is generally very accurately made and adjusted to the camera and lens with which it is to be used. When so correctly adjusted, those skilled in its use find this sort of finder fairly satisfactory and efficient for its purpose. But note the necessity of accurate adjustment and skill in its use. The objections to this type of finder are the smallness of the picture image (the viewing screen rarely exceeding one inch in diameter), and the necessity of viewing the image from a point directly above the center of the finder screen in order to see the subject correctly, i. e. as it will appear in the negative. If viewed from an angle, that is, if the eye is not immediately above the center of the finder screen, the view of the subject obtained in the negative will not coincide with that seen on the finder. Whether objects or parts of the subject lying at the margins of the finder screen are included in the negative or not, depends upon the accuracy of the adjustment of the finder to the lens with which it is used. In practice, with all but full-size "finders," it is safest to get the principal object or interest in the subject photographed well within the limits of the finder. This is especially applicable to near objects and moving objects. When the object or part of the subject especially desired in the picture is at some distance away from the camera, the need for exact accuracy or care in "finding" is not so urgent.

Many of the better kinds of hand cameras are now fitted with a "rising front." This is a movement of the lens board by which the lens may be raised vertically from its normal position opposite the center of the plate or film, by which one may cut off or reduce the amount of foreground and add to or increase the amount of sky, or the upper portion of the subject, in the negative. The average box or brilliant finder, even though it be fixed to the "rising front," fails to record this change, and is therefore undependable as to this detail when the "rising front" is used. There are finders which have a special adjustment to indicate the change effected when the rising front is used, but these are not fitted to any American hand camera as far as I know. The only remedy is to fit a temporary ground-glass focusing screen to the back of the camera, use the rising front movement at its full capacity of rise, and then score a thin black line across the finder screen to indicate the amount of the subject or foreground cut off by the movement. This will, at least, give you a rough guide as to the change effected by the use of the "rising front."

Testing for Accuracy. If it is found that, in ordinary practice, the view obtained in the negative rarely coincides with that observed on the finder screen, this may indicate that the finder is defective, i. e. has not been adjusted for the camera. It is particularly important that the finder shall correctly indicate the positions of objects within the limits of the film or plate used when one is photographing large figures or objects in motion. To test the finder for accuracy in this detail, select a scene including strongly marked vertical and horizontal lines, set the camera on a tripod or other rigid support and fix a temporary ground glass screen to the back of the camera as already mentioned. Now, setting the focusing scale pointer at the infinity mark, open the lens to its largest aperture or stop, and shift the camera to one side so that the strongly marked vertical lines in the scene are brought to the edge of the focusing screen. Examine the image on the finder screen and see whether the verticals are in the same position on the finder as on the focusing screen. If they are nearer the center of the finder, this indicates that

the finder screen includes a wider view angle than the limits of the negative. This can be excluded or marked off the finder screen by the use of black paint or gummed paper. If the finder includes less of the subject than the negative, send the outfit back to your dealer for correction and adjustment.

The Direct-Vision Finder is so called because in its use we "find" the picture by looking directly at or through the finder with the camera held at eye-level, instead of looking down at a reflected image of the subject as in the use of the box or brilliant finder. This, as we will see, offers many advantages. The commonest form of direct vision finder consists of a metal frame, much smaller than the film or plate used but proportionate in shape, enclosing a rectangular reducing-lens with two black cross-lines indicating its center. This is hinged to a metal base and fixed on the back of the top or side of the camera. In use it is turned to the vertical position, folding down when not in use. An inch or two behind this reducing lens and also hinged to the metal base, is a little metal eyepiece or sight which folds down under the reducing lens when not in use. By touching or releasing a catch the reducing-lens (finder screen) and sight spring to the vertical position for use. On raising the camera to eye-level and placing the eye close to the sight and exactly in line with the cross-lines at the center of the finder screen, a small but exact view is obtained of the subject as it will appear on the film or plate. Usually, such finders are as small as the box finders they replace, but they can be obtained in larger sizes which are preferable where the film or plate used exceeds $1\frac{1}{2} \times 2\frac{1}{2}$ inches.

The Wire Frame Direct Vision Finder is at once the most practical and most rarely seen and used form of finder. In my opinion, it is the one finder which every hand camera worker should possess and use, unless his only camera is a reflex, in which case he has no need of it. This form of finder is simply a wire frame, of the same size and shape as the film or plate in use, and hinged or attachable to the lens on the camera, the shutter case, or the lens-board. If so fixed by means of a spring hinge to the shutter case, so that it can be

instantly erected vertically over the lens for use or folded down over the lens and shutter when not in use, it can be carried as part of the camera without inconvenience. The eyepiece or sight for such a finder is a piece of thin metal, about $1 \times 1\frac{1}{2}$ inches, in which a circular opening or hole is pierced near the top end, and placed vertically in a slot at the back of the camera, central over the film or plate, so that the aperture is exactly in line with an imaginary point at the center of the finder. In use one brings the camera to the eye-level, steadying it easily against the eyebrow and cheek bone, placing the eye close to the sight or aperture and so looking directly through the wire frame at the subject.

Pro and Con. Such a finder gives almost all the advantages of the full-size focusing finder-screen of the twin-lens or reflex type of hand camera. It enables one to see the whole of the subject included on the film or plate, full size, before and up to the moment of exposure; to arrange the composition to our liking; or to follow the movement of any object within the field of view with perfect accuracy. The subject is seen non-inverted, right side up, and the view obtained is equally accurate with lenses of different focal length, and the differences effected by the use of the rising front are shown—if the finder is fitted over the lens as provided. Its size is an obvious advantage; it requires no shielding in sunlight, and it allows for the varying angle of view included in photographing near and distant objects, except when the objects are very near, say within ten feet. As against these big advantages, the wire frame finder has the single disadvantage that its use requires the camera to be held at eye-level, which is said to be a difficult position and less conducive to steadiness than when the camera is held against the chest or at the waist level. But this fancied objection hardly applies to the small, compact hand cameras of today. Moreover, the drawing of an object or perspective of a view photographed from the level of the eye is much nearer to the view as seen by the average person, and generally more pleasing than the view obtained from the waistline position.

The Full Size Focusing Finder, which is one of the big features of the reflecting-mirror (Graflex) type of hand cameras is, without doubt, the most satisfying and efficient of finders. But it involves the bulky construction peculiar to this kind of camera. It needs no description or explanation. As in the miniature box finder already mentioned, the picture image of the subject is projected by the lens onto a mirror hinged at an angle of 45° behind it, and in turn reflected by the mirror to a ground-glass screen of the same size as the film or plate in use, set in the top of the camera. The picture image is screened from the glare of light by being enclosed in a folding or collapsible hood above the ground glass screen. By erecting this and placing the eyes at the top of the hood, one views the image in its full size, non-inverted, just as it will appear in the negative, and focusing this image on the screen also focuses it on the film or plate at the back of the camera. Thus the screen serves as a full-sized finder and focusing screen, enabling one to find or follow the subject and focus it at the same time, right up to the instant of exposure. The efficiency of this form of finder could hardly be improved, except by the invention of a viewing and focusing screen needing no hood or shield, and fitted to a camera more compact in construction and collapsible when not in use.

Know Your Finder. With this knowledge of "finders" and "finding" the reader can now appreciate the importance of correct "finding" as an operation, and a familiar acquaintance with the "finder" on his camera as a means to this correct "finding." It is impossible to overstate the vital importance of practical skill in the use of the finder, whatever its form, especially in the photography of moving objects, the including of large objects in the view and in the composition or arrangement of the subject. This means a critical testing of the accuracy of the finder by trial and observation, and practice drill in finding or following all sorts of subjects under different conditions and with the camera held in a variety of positions.

Holding the Camera. It is important to learn how to hold the hand camera steady, i. e., without movement,

during the exposure. The actual position of the camera, i. e., the place in which or the part of the body against which it is held will depend in part upon the type of finder with which it is equipped. But the holding, as far as steadiness is concerned, is a thing apart from position and can only be learned by practice, modified by the personal habit or preference of the individual worker. In practice the difficulties increase as the camera is light and small in bulk, and as the exposure shutter is slow or otherwise in its speeds. Thus the inexpensive box camera with its slow shutter speeds often gives a higher percentage of successful pictures (free from blur caused by movement or tremor during the exposure) than the light, folding camera with higher shutter speeds, simply because its form and bulk lend themselves to steadiness in the hands. This feature is also a factor in the successful use of the reflex camera, the form, bulk and weight of which ensures steadiness during exposure.

For the light, folding camera fitted with a box or brilliant finder, the best way of holding is perhaps by resting the elbows against the hips, then raising the camera so that the image in the finder can be seen without stooping forward. Another way is to hold the camera with very light pressure against the lower chest (with the lungs deflated) during the exposure. Some hand cameras can be held with advantage within the fold of an arm, the exposure release being operated by the right hand. Reflex cameras are usually held at the waistline, firmly grasped by one hand (but not clutched with a vise-like grip), the other hand being kept free for focusing and releasing the shutter. For some subjects, as when photographing in a crowd, the camera is held up over the head, or, as in photographing children out-of-doors, supported on one knee.

Focusing the Picture. This is the second term in our formula for success with the hand camera. It simply means getting the subject in focus or sharply defined as to its outlines and details on the film or plate in the camera. Since the photograph will not please or satisfy unless it presents the form and details of the subject with reasonably sharp definition, as seen by the

eye, it is obvious that "focusing the picture," i. e., securing the desired degree of sharpness of definition, is fundamental. To get an intelligent grasp of this problem of focusing the picture, we must first know something about lenses and the part they play in the formation of picture-images in photography.

The Picture-Image. How do we form the visual picture-images of the things we say we see? Let us consider all visible things as bodies whose surfaces are made up of an infinite number of luminous points, with every point reflecting light in every direction by means of what we call light rays. When we look at any object, such as the face of a friend—directing the gaze particularly to one part or feature of the face, as the nose—the lens of the eye gathers the rays of light reflected by all the points in that feature, and brings them together or re-forms them as points again on the retina. This bringing to points again of the point-image bearing light rays reflected by the object seen is called "focusing," and forms a picture-image of the nose within the eye, sharply defined as to its form and outlines, each point in the image so formed being a counterpart of a corresponding point in the object.

Note here that the other features of the face within the range of vision, though seen or perceived at the same time, are not so sharply focused or as plainly defined in detail as the feature upon which the gaze is directly concentrated. As the gaze instinctively shifts from one to another feature, to satisfy the desire to see that other feature more plainly or to examine it with greater exactness, this latter is in turn "focused" or sharply defined on the retina. Thus it is seen that the eye cannot, at one and the same time, "focus" or form equally sharp images on the retina of objects situated at different distances away from it or, as we say, lying in different planes.

The photographic lens forms its picture images on the focusing screen or film just in the same way as the eye forms the visual picture-image. And like the eye, so the lens cannot bring to points or "focus" in one plane the luminous points reflected by objects lying in different planes in front of the camera. Thus, if we

"focus" or get on the focusing screen of the camera a sharply defined image of an object lying, let us say, twenty feet away from the camera, it will be seen that objects situated at lesser and greater distances away are not as sharply defined on the screen at the same time, but are more or less "blurred" or unsharp.

Sharp and Unsharp Images. We now have a conception of the picture-image of the photograph as made up of infinitely small points reproducing the light-reflecting points which make up the appearance or form of the subject. If the picture is to be "sharp" or agreeably defined for viewing at the normal distance from the eye, it is agreed that the points making up the image must not exceed 1-100th of an inch in diameter. This limit of size is called the "circle of confusion," because if the image-point exceeds this limit we get confusion in the definition of the subject, i. e., "blur" or unsharpness. When the hand camera picture is small and intended for after enlargement, it is obvious that this generally accepted disc or "circle of confusion" is too large, hence for such purposes a "circle of confusion" not exceeding 1-200th or 1-250th of an inch is advised. We will see the significance of this when we come to consider the problem of "depth of focus" or depth of definition as the term should be. Note here in passing that all lenses, regardless of their price, are alike or equal in this ability to "focus" or bring the light rays reflected from points in an object together again as points in the picture image. The claim that the high-priced anastigmat gives better definition than the simple lens fitted to the inexpensive camera is misleading in that it is true, but refers to corrections or refinements or extensions of the defining power of the lens other than and beyond its ability to "focus" an object, or for the uses of the lens in hand camera photography.

Focusing with a Hand Camera. The method of focusing varies in different kinds of hand cameras. In reflecting-mirror cameras, such as the Graflex, and in all cameras equipped for use with plates and possessing a ground-glass focusing screen, the picture-image is focused by adjusting the separation of the lens and focusing screen until the image of the subject is

seen to be sharply defined on the screen. This adjustment may be done by simply sliding the front of the camera backward and forward to and from the screen (in grooves on the base of the camera), and fixing or clamping the front at the point where the "focus" is obtained. Usually, however, it is done by means of a rack and pinion screw movement operated by a milled head attached to the lens front of the camera and projecting at the side. This is the perfect way of focusing not only because the picture-image is under actual observation, but also because it gives complete control over the definition of the image. Thus it permits of selective focusing, i. e., we can choose the plane or part of the subject where maximum definition is desired, with the necessary result that all other parts of the subject in the picture-image will be less sharply defined or softened in definition, as they lie in front of or behind the plane of principal focus. This is of great advantage in pictorial and commercial work, and in portraiture, where it is often desirable to emphasize the definition of some particular part of the subject and to suppress or subordinate details in other parts.

In "Fixed Focus" Hand Cameras, or in "focusing cameras" fitted with an "automatic focus lock," the lens is fixed at such a distance from the film or plate that all objects beyond a certain number of feet away from the camera will be in focus, i. e., equally well defined or agreeably sharp in the negative without any adjustment on the part of the user of the camera. Here the operation of focusing is eliminated. Loaded with film or plate, the "fixed focus" camera is always ready for exposure without further adjustment than the "sighting" of the subject on the finder. All we have to remember is that the nearest object which we desire sharply defined in the negative must be beyond a certain number of feet away (known as the minimum distance) from the camera. This "minimum distance" varies with "fixed focus" cameras according to the focal length of the lens and the size of the lens aperture (diaphragm or stop) in use. The shorter the focal length of the lens and the smaller the lens aperture, so much the nearer is the distance away from the camera beyond

which everything will be in focus. For example, with a $3\frac{1}{2}$ -inch lens and stop $f/8$ (U. S. 4), all objects beyond 7 feet away will be agreeably sharp in the negative, while with a $5\frac{1}{2}$ -inch lens and stop $f/6.3$ (U. S. $2\frac{1}{2}$) everything beyond 22 feet away will be in focus. For this reason the "fixed focus" principle is rarely applied to or used with cameras larger than postcard size, and is, in fact, generally employed with vest-pocket and miniature cameras, whose lenses rarely exceed $4\frac{1}{2}$ inches in focal length. For other interesting facts related to "fixed focus" cameras, see the paragraphs on "Hyper-focal Distances" and "Depth of Focus" on later pages.

Obviously this "fixed focus" principle simplifies hand camera work immensely, since it eliminates a difficult but essential operation in picture making with a hand camera, i. e., the problem of focusing the picture image. But it necessarily limits the capacity of the camera in use and imposes restrictions which are undesirable.

Focusing by Scale. The great majority of hand cameras have no focusing screen, being intended for use in the hands, which hardly permits the use of such a screen except where it is set in the top of the camera, e. g., in the reflex type. For this reason the focusing of the picture-image in hand camera work is generally done by means of a focusing scale. This is usually a small tablet of metal or celluloid fixed to the base of the camera at one side of the lens front when the camera is extended for use. It is marked by cross-lines numbered with figures indicating feet, metres, or yards. As the lens front of the camera is extended past this scale, a small pointer attached to the lens front moves over the cross-lines of the scale, and the lens front may be fixed or clamped at any point indicated on the scale. This fixes the separation of the lens and film and is said to "set the focus." The focusing scale is, of course, marked and adjusted for use with the particular camera and lens to which it is attached. Thus, when the pointer is set to the cross-line 10 on the scale, this indicates that objects lying 10 feet away from the camera are in focus, and so on. At one end of the focusing scale the letters INF (an abbreviation of the word "Infinity") are marked.

This, in practice, simply means that when the pointer is set at this mark, all objects beyond a certain distance away from the camera (the "hyperfocal distance") will be in focus in the negative.

The Key to Success. The use of the focusing-scale presumes the ability in the worker to correctly estimate or guess the distances of objects away from the camera. This is the great big difficulty in focusing by scale. To get a sharply defined picture of any object before the lens, we first estimate the distance of the object away in feet and then set the pointer over that figure on the focusing-scale, moving the lens front forward or backward until the pointer is exactly over the line marked with the figure representing the distance away (in feet) of the object to be photographed. If we measure the distance with a tape and so get the actual distance, and set the pointer over the scale accordingly, then we will get a sharply defined picture of the object in the negative. But if we estimate or guess the distance (which is the universal habit), then whether the subject is sharply defined or not depends on the accuracy of our estimate or guess. So focusing successfully by scale depends chiefly on our skill in estimating the distances of objects lying in front of the camera, the placing of the pointer over the right line of the scale being a simple matter requiring only care to fix the pointer precisely on the line representing the number of feet we estimate the object to be away from the camera. Few people can estimate distances correctly. The ability, however, can be acquired with patience and practice, and the hand camera worker should school himself deliberately in this detail, measuring and pacing such generally used distances as 10, 15, 20, 25, 30, 50 and 100 feet until he can depend on the accuracy of his guess when working in the open without tape or measure. There are in the market distance meters and similar devices for this calculating of distances.

Limiting the Necessity. This necessity for accuracy in estimating distances in focusing by scale applies chiefly to the near distances, i. e., when objects at 10 to 40 feet away are to be included in the picture,

as in street-views and similar scenes popular with the amateur. It applies with equal force when we desire to get any particular object in or part of a subject sharply focused with the other parts of the subject softly defined or less sharply in focus. These details are explained in the paragraphs on "hyperfocal distances" and "depth of focus" in later pages. Suffice it to say here that the lenses fitted to the small cameras now in general use will, so to speak, take care of the focusing of objects lying farther away than 25 feet without any trouble on the part of the photographer in estimating their precise distance. So, it comes to this, that when photographing near objects by scale, or when near objects are included in the subject, the reader must correctly estimate the distance of these objects if he desires them sharply defined in the picture. Where there are no conspicuous objects in the scene nearer than 30 to 40 feet, or the chief interest in the view is more than 40 feet distant, the exact distance of such objects is not of great importance.

Kodak Range-Finder. An ingenious device introduced to overcome this difficulty of estimating the distances of near objects is the Kodak Range-Finder, as yet fitted only to the 1A and 3A Kodak Specials. It is apparently intended for the accurate focusing of objects within 50 feet away from the camera, and is used instead of the focusing-scale. The device consists of three mirrors and a tiny prism, built in the base of the standard supporting the lens and shutter on the camera. In use, the camera is pointed at the subject and the finder shows three brilliant images of the principal objects in the view (not all the area or full field of view included by the camera lens, so it cannot be used as a view-finder). Generally, at first inspection, these three images, each representing part of the subject, do not present the subject with its natural continuous unbroken outline. For example, in the triple image of the figure of a boy, the head may appear away at one side of the body, and the limbs do not connect with the lower part of the torso. By turning the focusing-screw, the head is placed properly on the body and the limbs brought into their proper position, so that the outline of

the figure becomes normal and continuous in line. This indicates that the figure is correctly focused on the film or plate. Incidentally, this adjustment of the outline on the Range-Finder brings the focusing-scale pointer over the correct figure on the focusing-scale. For objects at 50 or 100 feet away, of course, the quickest way to focus is to place the pointer of the focusing-scale over the lines marked with these figures, the hyperfocal distance of the lens ensuring sharpness for all objects at these distances.

Other Factors in Focusing. With this knowledge of the methods of focusing with hand cameras, we can now turn our attention to other points which are intimately related to the successful use of these methods. Let us first consider the "other factor" of chief importance, viz., "depth of focus" which in practice means getting everything in the picture sharply defined in the negative.

Depth of Focus. In order to get all we desire of a subject clearly and sharply defined in the negative, it is usually advised to focus sharply on some object in the middle distance of the field and then "stop" the lens down, that is, use a smaller aperture, to get subjects fairly near the camera in focus. But a better way is to know the depth of field capacity of the lens on the camera at different apertures and apply this knowledge in your work. Theoretically, a lens can give a sharply defined image only of objects at one point or, as we say, lying in one plane, in front of it. But, practically, we find that the lens will give a more or less sharply defined image of objects somewhat in front of and behind this point or plane of critical focus or definition. The range of this distance is spoken of as the depth of field, or depth of focus, of the lens. This depth of focus depends on the relation between the focal length of the lens and the aperture or stop used with it. Generally speaking it increases as the focal length of the lens and the size of the aperture decreases. Thus, of two lenses of the same speed, but unequal in focal length, the lens of shorter focal length will give the greater depth of focus. This explains why a 5 x 7 enlargement, made from a pocket-camera negative, with a 3-inch lens working at $f/4.5$,

will have more depth of definition than a 5 x 7 contact print from a negative made with a hand camera fitted with a 7-inch lens working at the same speed, viz., $f/4.5$. It also explains why the pocket camera lens, regardless of the aperture or stop used, gives pictures with greater depth of definition than those made with the larger hand camera where the same apertures are employed, but with a lens of greater focal length.

Calculating Depth. Knowing the focal length of the lens and the $f/$ value of its apertures, as marked on the lens itself or on the shutter, it is a comparatively simple matter to figure out just what amount of "depth of focus," i. e., the distance or range of depth between the nearest and farthest objects which will be in focus when the lens is focused upon an object at a given distance, we will get with any lens and any given stop. If the reader will do this for the lens on his hand camera, the information so gained once for all will serve him as a most valuable aid in getting good photographs.

Hyperfocal Distance. First we need to know the hyperfocal distance of the lens. This can be seen at a glance, for lenses of focal length from $2\frac{1}{2}$ to 7 inches, for all the apertures in use, by a glance at the Table of Hyperfocal Distances given herewith.

For example: suppose the camera is fitted with a lens of 5 inches focal length with $f/8$ (U. S. 4) as its largest aperture, and we want to use it for street-views with 20 feet as a desirable working distance. Find the focal length of the lens in the extreme left-hand column of the table, and a glance at the columns to the right will tell us that if we once correctly focus an object 26 feet away from the camera using $f/8$ or simply set the pointer of the focusing-scale over the figure 25, we can use the camera as a "fixed focus" instrument and get sharp pictures of all objects more than 15 feet away so long as we keep the lens fixed at that distance from the film.

To find the hyperfocal distance for any lens and stop, first determine the permissible amount of blur. In the table given above the usual disc of confusion of $1/100$ th of an inch was chosen as the basis. Now square the focal length of the lens in inches, multiply the result by 100, and divide the product by the $f/$ value of the

lens aperture or stop. For example: a 5-inch lens at f 8 has a hyperfocal distance of $5 \times 5 \times 100 \div 8 = 312$ inches or 26 feet. If the negatives are small and intended for after enlargement, a smaller disc of confusion should be taken, say 1-250th of an inch. In such a case multiply by this figure (250) instead of 100.

TABLE OF DISTANCES ON WHICH TO FOCUS

with lenses of different lengths and different lens-apertures (stops), so that all objects beyond half that distance will be in focus. Disc of confusion taken as 1-100th of an inch.

Focus of Lens in Inches	Diaphragm Apertures: F Values and U. S. Numbers							
	F 4 U.S. 1	F 5.6 U.S. 2	F 6 U.S. 2.25	F 7 U.S. 3.06	F 8 U.S. 4	F 11.3 U.S. 8	F 16 U.S. 16	F 22 U.S. 32
	Distances in Feet							
2½	13	10	9	8	7	5	3½	3
3	19	14	13	11	10	7	5	3½
3½	25	18	17	15	13	9	7	4
4	34	24	22	19	17	12	8	6½
4¼	38	27	25	21	19	14	10	7
4½	42	30	28	24	21	15	11	8
4¾	47	34	32	27	24	17	12	9
5	52	36	35	30	26	19	13	10
5½	63	45	43	36	31	23	15	12
6	75	54	50	42	38	27	19	14
6½	88	62	58	50	44	31	22	16
7	101	72	68	57	51	37	25	17

Finding Depth of Field. To use this Table to learn the maximum depth of focus available when you focus sharply on any particular object in or part of a view, proceed as follows: (a) Multiply the hyperfocal distance given by the Table for your lens and the aperture in use (in inches) by the distance of the object (in inches). (b) To find the nearest point or object which will be in focus, divide the sum of (a) by the hyperfocal distance (in inches) *plus* the distance of the object focused on (in inches). (c) To find the farthest point which will be in focus, take the sum of (a) and divide

it by the hyperfocal distance *minus* the distance of the object focused upon. The distance between the nearest and farthest points in focus is the depth of focus available with your lens and the stop in use for any object at the distance chosen for the point of particular focus. For example: we want to know the maximum depth of focus available when we focus sharply on an object 12 feet away from the camera, with a lens of 5-inch focus and aperture $f/11$ (U. S. 8). The Table tells us that the hyperfocal distance for that lens and stop is 10 feet. Then 228×144 inches = 32,832 inches $\div 228 + 144 = 88$ inches (7 feet, 4 inches) is the distance of the nearest object which will be in focus. Again: 228×144 inches = 32,832 inches $\div 228 - 144 = 391$ inches (practically 33 feet). Thus the Table tells us that if, using a 5-inch lens at $f/11$ (U. S. 8), we focus sharply on any object 12 feet away from the camera, the depth of focus available is practically from $7\frac{1}{2}$ feet to 33 feet away from the camera, and that all objects in or portions of the view within these distances will be satisfactory as to sharpness in the picture. It also tells us that, with that lens and aperture, all objects beyond 10 feet away will be in focus, and that we get the maximum depth of definition in the picture by focusing on an object 10 feet away.

Working Out a Table. This knowledge and its use is by no means as confusing as it looks in type. Knowing the focal length and apertures of the lens on your hand camera, the Table and formula just given will enable you to work out a special table for your lens, telling at a glance the depth of focus available when an object at any given distance is sharply focused, as well as the distance on which to focus to get the maximum depth.

TABLE SHOWING DEPTH OF FOCAL FIELD WITH A LENS
OF 5 INCHES FOCAL LENGTH

U.S. $2\frac{1}{2}$ $f/6.3$	U.S. 4 $f/8$	U.S. 8 $f/11$	U.S. 16 $f/16$	U.S. 32 $f/22$
6 8 11	6 8 11	4 6 8	4 6 11	3 5 11
8 10 14	8 10 16	6 8 13	5 8 21	4 7 32
10 15 28	9 15 35	7 10 21	6 10 43	5 9 Inf.
12 20 53	11 20 87	8 15 71	7 13 Inf.	
14 25 114	13 26 Inf.	10 19 Inf.		
16 32 Inf.				

I give such a Table for a 5-inch lens. Observe that under each lens aperture we have a set of three numbers in horizontal line. These are distances in feet. The middle figures in each column give the distance of the "principal focus" or object sharply focused. The left-hand column gives the distance of the nearest object in focus, and the right-hand column the distance of the farthest object in focus. Thus with stop $f/11$ (U. S. 8), if we focus on an object 8 feet away from the camera, the Table tells us that the maximum available depth of field is 7 feet, i. e., objects as near as 6 feet and as far as 13 feet away from the camera will be in focus.

Depth of Focus Rules. (1) Depth of field varies inversely as the square of the focal length of the lens. Take two lenses of 4 and 6 inches focal length respectively—4 squared is 16, and 6 squared is 36; 36 divided by 16 is $2\frac{1}{4}$; therefore the 4-inch lens gives a field of depth of focus $2\frac{1}{4}$ times the depth of the field with a 6-inch lens, using the same stop or aperture in both cases. (2) Each alternate stop or aperture smaller doubles the depth of focus obtained. That is, with any lens $f/11$ will give twice the depth obtained with $f/6$, $f/32$ twice the depth obtained with $f/16$, and so on. These rules account for the great depth of focus obtained with the very short-focus lenses used with miniature or pocket cameras.

Finding "Stop" for Given Distance. To figure out quickly a larger stop or lens-aperture that will enable us to include objects as near as "so many" feet, for example: What is the largest stop we can use to include objects 12 feet and beyond with a lens of 5 inches focal length? Square the focal length, i. e., $5 \times 5 = 25$; multiply this by 4 = 100; divide 100 by 12 = 8—practically $f/8$. Here it would perhaps be safer to cut the aperture down to about $f/9$. To put the question another way: How near may we approach an object with a 6-inch lens and an aperture $f/8$ and expect reasonably sharp definition in the negative? Square the focal length as before, i. e., $6 \times 6 = 36$; multiply 36 by 4 = 144; divide this by the $f/$ number, viz., $8 = 18$, that is, 18 feet.

Exposure. We now come to the third and most important term of our formula for successful hand camera work, viz., the exposure. Here we face real difficulties, for despite the wonderful "latitude" of our modern sensitive films and plates, the exposure for any given subject must be approximately correct in order to secure in the print a satisfactory or pleasing record of the subject as seen by the eye at the time of photographing. This estimation or determination of even an approximately correct exposure for every sort of subject and under widely different conditions, where the difference between success and failure is a fractional part of a second in time, is admittedly a complex problem. Nevertheless I can promise the reader that, if he will take the trouble necessary to get a clear understanding of the problem in the beginning, the difficulties will quickly disappear, and he will find its solution comparatively simple.

The Three Ways commonly adopted in practice to determine the exposure required by any given subject are as follows: (1) By the invariable use of an exposure meter of the actinometer type, such as the Heyde, Watkins, Wynne, or Steadman meters, which measure the actinic strength or photographic intensity of the light reflected by the subject at the time of photographing. This gives a number or figure which, applied to a dial or table forming part of the meter, gives the exposure required for any film or plate of known speed and any lens aperture. (2) By combining one's general knowledge of the factors which control exposure with the use of an exposure calculator, such as the Actinograph of Hurter and Driffield, the Harvey or Imperial meters, which give the exposure required by the manipulation of a slide rule; or by the use of Tables such as may be found in *THE PHOTO-MINIATURE*, Nos. 54 and 105, dealing with outdoor exposures, and No. 157 treating of exposures indoors. (3) By guesswork or instinct, or a sort of intuition based on long practice and familiarity with exposure conditions, and more especially on a critical estimation of the brightness of the image on the ground-glass focusing screen of the camera—not available with most hand cameras. This method is

almost wholly employed by professional photographers working under known and standardized conditions.

Which Method To Use among these here outlined, all successful in practice, must be left to the personal choice of the reader. The first method is undoubtedly the best, based as it is on an actual measurement of the light at the moment of exposure. Here the use of an exposure meter, such as the Heyde, solves the exposure problem from the beginning. Moreover, by compelling a personal observation of the light reflected by the subject at the time of photographing, the use of such a meter brings a practical knowledge of the basic problems of light, film, subject, and lens aperture which, after a little experience, may obviate any necessity for the use of the meter except for test exposures and unordinarily difficult subjects. The second method, i. e., the use of calculators and tables, is perhaps simpler and quicker in practice than the first, and in no way falls short as far as indicating approximately correct exposures is concerned; while the third method (hardly open to hand camera workers and not advisable on principle) has proved so completely satisfactory in generations of practice that those who use it are apt to scorn the notion of bothering with any instrument or calculator. Be this as it may, and regardless of the method adopted, the reader cannot fail to profit by a careful consideration of the basic factors of exposure hereinafter very briefly considered.

The Controlling Factors in determining exposure are (1) The Strength of the Light (which varies with the time of day and season of the year, the weather and atmospheric conditions). (2) The Speed of the Plate or Film used (which may be made invariable by the choice and use of one brand for everyday work). (3) The Character and Color of the Subject (which includes its distance away from the camera and its speed or rate of movement if we are photographing a moving object). (4) The Focal Length and Aperture of the Lens. In use these factors are standardized as far as may be possible, then considered in relation to each other and collectively; by which process is determined the period or total time of exposure required, usually

expressed (if we are using a hand camera) in a definite shutter speed. Possessing a fairly wide knowledge of these controlling factors, their successful application in specific instances by means of a formulated system, e. g., a meter, is in practice comparatively simple and offers the easiest way of solving the problem of exposure.

To discuss these factors adequately in all their possible variations and modifications would carry us far beyond the limits of this little book, and might well beget confusion in the reader. For which reasons I will content myself here with a simple statement of the matter, urging the reader to give further study to a good text book on exposure, such as the "Watkins' Manual of Exposure" or the numbers of *THE PHOTO-MINIATURE* already mentioned. These last are out of print but may be found in the larger public libraries, or "picked up" at the stores of dealers here and there. In my opinion they offer the most practical guides to the problem of exposure in the language.

The Strength of the Light. The technically perfect photograph is one which reproduces all the tones of the subject, from the highest light to the deepest dark, in their correct or natural relationship and gradation. This implies an exposure sufficient to impress the darkest tones of the subject, i. e., the shadow details, on the sensitive film. Hence the first and golden rule in exposure is: Expose for the shadows.

The strength of the light, by which we mean its actinic intensity or power to affect the photographic film, varies from day to day around the year according to the sun's altitude in the sky, the weather and atmospheric conditions, and, of course, any physical obstructions which may prevent the light from reaching the subject in any degree. Hence, exposure calculations are usually based upon the light at noon, on a clear June day, when the sun reaches its highest altitude above the earth. If we take this as a unit having the value of 1, then, assuming the sky to remain unchanged, the light at different hours of the day will vary as 1 to 8, having the value of $\frac{1}{8}$ in the early morning and late afternoon hours. Again, if we accept the light at noon in June as represented by the value 1, then at noon in spring

and fall (March–April, August–September) it will be about $\frac{3}{4}$, and in winter (November–February) about $\frac{1}{2}$. These are approximate values, based on common experience. According to some authorities, the variation of the light-power during the year is from about 1 to 16. As far as changing weather and atmospheric conditions are concerned, Hurter and Driffeld state the variation from “very bright and clear” to “very dull” to be as 1 to 4, the place, time of day and season being the same. Alves, in his monograph on “Outdoor Exposures” gives the variation as 1 to 5, with 1 to 3 as practicable conditions. Where color influences the atmospheric conditions, as at or near sunset when the dust-laden atmosphere is yellowish red, the variation in actinic intensity is greater and may be as 1 to 7.

The Speed of the Film or Plate used is a variable factor only brought into consideration where different brands of plates or films are employed. It can be eliminated in hand camera work by choosing and sticking to one brand of film or plate. Where it must be considered, then the reader must consult a plate speed table in order to get the known speed of the film or plate in use. This is at best an uncertain matter as plate speeds vary in a remarkable degree. But for average hand camera work this variation may be expressed in proportional exposures about as follows: Ultra-rapid plates 1; rapid plates and films $\frac{1}{2}$; plates of medium rapidity 3.

The Character and Color of the Subject. The subjects usually selected in every-day hand camera work may be roughly classified or characterized as: (a) Distant (open) landscapes; (b) landscapes with light foreground; (c) landscapes with strong or fairly dark foreground; (d) street-views or buildings almost wholly composed of dark and near objects; (e) landscapes with extra dark foreground; (f) figures at 20 feet or so away from the camera; (g) figures, large and near. Here it is the distance of the most important part of the subject which calls for careful consideration as chiefly influencing exposure. A rough approximation of the variations resulting from the influence of this factor is 1 to 10. Taking the landscape with fairly strong foreground

given above (*c*) as a standard subject for comparison, then subjects such as (*a*) would require about one-quarter of the exposure required for (*c*); (*b*) would require half the exposure necessary for (*c*); (*d*) twice the exposure for (*c*); (*e*) and (*f*) three times the exposure given (*c*); and (*g*) four times the standard exposure (*c*).

The direction of the light falling on the subject must not be overlooked as influencing the character of the subject as here considered. Roughly one may say that subjects photographed against the light require two or three times the exposure demanded by the same subject under normal illumination, i. e., with the sun behind and at one side of the camera.

Sea and sky views, without dark objects in the foreground, require from one-tenth to one-sixteenth the exposure called for by the standard subject (*c*); while sea views with shipping and snow scenes (without a color filter on the lens) require one-quarter the exposure required for (*c*). Scenes lighted by strong, clear sunlight where strong shadows are included, call for more exposure than when lighted by a diffused light, e. g., the increase may be as $\frac{1}{2}$ to 1 or more.

In portraiture out-of-doors, as in gardens, the variation from exposures in bright diffused light to exposures in shadow and with a dark background will vary as 1 to 4.

These, as I have said, are but approximate values helpful in the estimation of outdoor exposures. The advantage of an actinometer exposure meter is here seen, in that if used in the shadow of the subject it gives the actual photographic power of the light under the precise conditions at the time of exposure.

Color in the subject deserves more consideration than it has thus far received at the hands of exposure experts. Most tables and calculators wholly ignore it, but it has its influence on exposure. Thus, if we give the average scene the value of 1, then where the predominant coloring of the subject is gray or white in color the exposure may be halved, but if red, yellow, or dark objects predominate, then it should be doubled.

The distance away from the camera of the object of chief interest in the subject has an important influence on the exposure required. The nearer the object is to

the camera, the longer will the required exposure be. The variation here is as 1 to 10. Thus, a prominent building photographed from across the street will require an exposure ten times longer than if it were photographed from a distance of say, a quarter of a mile away. Similarly the rule for distant views is that the exposure for such a scene will be one-tenth or one-sixteenth that required for an ordinary landscape with light foreground.

In photographing moving objects, or subjects including fairly rapid movement, the factors ordinarily influencing exposure are subordinated, and new factors come into play which have to do with the movement in the subject. This means compromise and, generally, the result is under-exposure as far as the "still" portion of the picture is concerned. Here the question is not: What exposure will give me a truthful rendering of the light and shade effects in the subject? but: How long an exposure can I give and yet secure a sharply defined picture of the moving object, without blur or evidence of movement in the print? In other words, we have to find the minimum shutter speed (maximum exposure) permitted by the movement in the subject.

This part of the exposure problem is helpfully discussed in *THE PHOTO-MINIATURE* No. 77. Here I can only mention the chief factors involved and their practical use in estimating exposures. These are: (1) The speed at which the object is moving—ultimately the rate at which the image of the moving object travels across the sensitive film. (2) The distance of the moving object from the camera at the time of photographing—the nearer the object the longer the exposure, because the nearer the object, the larger will be its image on the film and the more apparent its displacement or movement. (3) The focal length of the lens used—the longer the focal length, the larger the image from any given viewpoint and the greater its displacement in a given time on the film.

These factors are modified (1) by the direction of the movement of the object—thus, an object moving directly across the field of view, at right angles to the axis of the lens, has twice the apparent speed of an

object approaching or receding from the camera at an angle of 60° ; (2) by counter movement, as when the moving object is photographed from a vehicle traveling in an opposite direction; and (3) by the separate or different movements of parts of the moving object, as the legs of a horse or the wheels of a motor car. Finally, we have to consider the "dead points" or period of suspended motion which forms part of all reciprocal movements—the end of the stride in running, the beginning of a stroke in rowing, and so on.

Always, too, we must keep in mind the amount of permissible blur, i. e., the size of the disc of confusion allowable in the picture, which must not exceed 1-100th of an inch and can with advantage be reduced to 1-250th of an inch.

The simplest formula for the practical use of these factors in estimating the exposure required by a moving object is as follows: Let D equal the distance between the object and the lens, expressed in inches; S equals the speed at which the object is traveling (estimated), expressed in inches per second; and F equals the focal length of the lens, also expressed in inches. Then E (exposure) equals D divided by S multiplied by 100 times F . If the circle of confusion desired is 1-250th of an inch, multiply S by 250 times F . For example: We want to photograph an object traveling at the rate of 12 miles per hour (211 inches per second), at a distance away of 50 feet (600 inches, with a lens of 6 inches focal length. What must the exposure be to get a sharply defined image of the moving object? $\frac{600}{211 \times 600} = \frac{1}{211}$ second. When the moving object can be photographed from a distance away equal to one hundred times the focal length of the lens used, then the "inches per second" expressing the rate of movement and considered as fractional parts of a second, may be used as the required exposure under normal conditions, without any need of calculation.

Focal Length and Lens Aperture. Leaving this digression into the photography of moving objects, let us turn to the remaining factors to be considered in the estimation of ordinary exposures, viz., focal length and lens aperture.

As we have seen, lens apertures are ordinarily marked by an f number, indicating the number of times which the diameter of the aperture divides into the focal length of the lens. Thus, a lens of 8 inches focal length and an aperture of 1 inch is said to have a rapidity of $f/8$ or "to work" at $f/8$. Now it is a geometrical fact that the area of a circle varies, not in proportion to its diameter, but in proportion to the *square* of its diameter. The rule here is that the exposure time required when different apertures of the lens are used varies as the square of the f number. Thus with an f number twice that of another the exposure must be increased four times; with one three times another, one must give nine times the exposure. If the lens apertures are numbered by the U. S. system there is no need for this "squaring," the exposures required being proportional to the numbers. Thus each succeeding aperture in that system has one-half the area of the aperture preceding it and requires the exposure to be doubled. So much for variations in exposure when different apertures are used.

The variations in exposure due to changes in focal length need to be considered when we use the front or back element of a doublet lens alone as a single lens. If the doublet is made up of two lenses of equal focal length and each double the focal length of the combined lens, then each f number must be doubled when either component is used alone, i. e., each aperture will now call for four times the exposure given when it was used with the complete lens. Some lenses are made with one component double and the other one and a half times the focal length of the combined lens. In the use of this latter component as a single lens, the exposures required would be $1\frac{1}{2} \times 1\frac{1}{2}$ times those given with each aperture as used with the complete lens.

Finis. With this we have completed our survey of the fundamentals of photography with a hand camera. If the reader has grasped the significance of what has been said on each point, and will apply his knowledge in the use of his own camera, he will find his hand camera work vastly more interesting in the doing and in the results.

Notes and Comment

AMERICAN CAMERA CLUBS. There are many signs of awakening to new life among our camera clubs, the news of their activities increasing in volume month by month. The Camera Club of New York has recently given interesting exhibitions of oil, bromoil, and "gum" prints by Dr. A. D. Chaffee and William Gordon Shields; intimate portraits by Rabinowitz, a talented, younger member of the professional workers of New York; a collection of work by members of the Club; artificial light portraits by Ned Van Buren, of New York and, in September, a collection of remarkably clever bromoil pictures by Bertram Cox, of London. All of these exhibitions deserve a more extended notice than space here permits. The Chicago Camera Club has prepared a programme for the 1920-21 season which includes monthly exhibitions, demonstrations, and informal discussions of technical and pictorial photography. The Camera Clubs of Los Angeles and San Francisco have similar plans for an active season of profitable work.

THE 1920 CATALOGUE issued by the Bausch & Lomb Optical Co., Rochester, N. Y., is quite as much a reference book of lens information as it is a descriptive list of the photographic lenses made by this well-known firm. In its 64 ample pages and beautifully printed illustrations, the reader will find the technical qualities of lenses and their choice and use for different classes of work discussed with all the directness and clearness of a textbook. In the lens catalogue proper, special prominence is given to the Tessar Ic, F:3.5 and F:4.5; IIb, F:6.3; the VIIa Protar and Convertible Protars VII in sets and the B. & L. Telephoto Attachment. Among many interesting facts we are told that the company now controls its own optical glass supply, independent of imported material, so that the complex glass problems arising in modern lens making can now

be worked out in its own plant. Copies of the catalogue can be had free, on request.

THE DEPARTMENT OF PHOTOGRAPHY of the Brooklyn (N. Y.) Institute of Arts and Sciences has prepared a remarkable list of proposed events—exhibitions, lectures, demonstrations and classes of instruction in photography for the ensuing fall and winter. Readers residing in or proposing to visit New York during the next few months should send for this programme and take advantage of the opportunities offered.

UNDER THE TITLE: "HERE'S THE ANSWER" the Abel Publishing Co., Cleveland, Ohio, has published a pocket-book of 95 pages, giving simple, direct answers to seventy-five photographic questions of special interest to the amateur. It is just the book to put into the hands of a beginner and can be purchased from most dealers. Price 35 cents.

THE RESEARCH LABORATORY of the Eastman Kodak Company, Rochester, N. Y., has published a revised list of the 750 Eastman Organic Chemicals manufactured or stocked by the Laboratory for the convenience of organic chemists seeking new or rare chemicals of standard quality. No. 244—Tetramethyldiaminodiphenylmethane suggests the possible source of the vulgar colloquialism: "You said a mouthful."

THE 1920 ANSCO CATALOGUE of cameras for amateur photographers emphasizes the fact that the modern hand or pocket camera is an instrument of precision, cleverly designed and compacted of fine materials and superb workmanship. Several new features are illustrated in this year's models: Thus, the popular Ansco Vest-Pocket No. O is provided with a focusing device which enables one to take full advantage of its high-grade lens equipment, viz., a Modico Anastigmat

F:7.5 or Ansco Anastigmat F:6.3 in the extra-speed Bionic Shutter, giving exposures up to 1-200th second. Another novelty is the Ansco V-P Junior, for pictures $2\frac{1}{4} \times 3\frac{1}{4}$, a round-cornered, extremely compact model, offering all the qualities of a high-grade camera at minimum cost. The "Depth of Focus" Tables for lenses of $3\frac{1}{2}$, $4\frac{7}{8}$ and $6\frac{1}{2}$ inches focal length, included in the catalogue will surely create a demand for copies which will speedily exhaust the supply. Every hand-camera worker whose camera is fitted with a lens of any of the focal lengths mentioned should secure a copy.

THE REXO DUPLI-KIT is an ingenious device for the making of half-size pictures on standard-size roll film, adapted for use with Rexo Film made by Burke & James, Inc., Chicago and New York. With the Rexo Dupli-Kit twelve pictures half the regular size can be made on a six-exposure roll, twenty on a ten-exposure roll, and twenty-four on a twelve-exposure roll. Thus the device makes two pictures grow where but one grew aforetime, a benefaction which will be welcomed by all users of Rexo Film.

THE GRAFLEX CATALOGUE for 1920 is now ready and can be obtained free of charge on request from the Folmer & Schwing Division of the Eastman Kodak Co., Rochester, N. Y. The popularity of the Graflex line has increased immensely during the past year or two and the manufacturers have difficulty in keeping the supply of some of the smaller models equal to the demand.

THE NATIONAL CONVENTION of the professional photographers of America was held at Milwaukee in August, and was in every way the most successful gathering in the history of the Association, having an attendance of almost 2,000 members present. The programme of the affair covered an unusual variety of interesting papers, demonstrations, and exhibitions, especial prominence being given to portraiture by artificial light —

in which professional interest is at present centered as the next step in the advance of professional portraiture.

During September the Photographers' Association of the New England States met in convention at Springfield, Mass. Many of the features of the national convention were incorporated in the programme of this affair, with the result that the convention was generally conceded to have been "the best ever."

With this awakening of new interests, the national and state associations are preparing an ambitious programme of work for the benefit of their members, to be carried throughout the entire year. This includes the establishment of a national, professional school for the training of apprentices, the organization of an exhibition of pictorial portraiture to be routed through the principal cities, and so on.

EUROPEAN SPECIALTIES. With the gradual resumption of foreign trade relations, many well-known European photographic specialties are making their reappearance in the American market. Thus Hauff's Developers—Glycin, Ortol, Amidol and Metol; Ensignette Cameras and the full line of Imperial Plates are announced by G. Gennert (New York, Chicago, and Los Angeles). The French stereoscopic cameras, Ontoscope, Gaumont Spido and Stereo-Blocknote, and Mil Melior; Krauss-Tessar anastigmats and other high-grade imported specialties are announced by A. Madeline, 1416 Broadway, New York. The C. P. Goerz American Optical Co. (New York) is importing the Goerz Vest-Pocket Camera with Goerz lenses, the Folding Ango and Roll-film Tenax cameras, etc. The Zeiss Lenses, Series Ic and Iib, Prism Binoculars, Microscopes and Telescopes; the Ica-Contessa miniature, hand, speed and stereoscopic cameras for plates and roll films are again obtainable from the U. S. Agent, Harold M. Bennett, 110 East 23d Street, New York. And the Heyde Exposure Meter, in an improved form, is imported by Herbert & Huesgen Co., New York. Descriptive lists or folders may be had on request addressed to any of these firms.

Books and Prints

THE COMMERCIAL PHOTOGRAPHER. By L. G. Rose. 146 pages; illustrated. Cloth \$4. Philadelphia: Frank V. Chambers.

In scope and wealth of detail this is by far the most comprehensive handbook to commercial photography thus far published. It has the greater merit of being thoroughly practical in its information, giving the working methods, formulas, and experience of its author, a well-known expert in this special field. To particularize the contents of the book would be to list the principal branches of modern commercial work. I therefore content myself with the comment that Mr. Rose has given us a manual and reference book which should be on the bookshelf of every professional and commercial photographer. The text is profusely illustrated and the volume is well printed and substantially bound for service.

A CONDENSED COURSE IN MOTION PICTURE PHOTOGRAPHY. Edited by Carl L. Gregory, assisted by many experts. 382 pages; illustrated. Cloth \$6. New York: New York Institute of Photography.

When I first dipped into the chapter of this book dealing with the Development of the Negative, my heart leaped at the discovery of a photographic writer who had something to say and knew how to say it. Reading on a little further I realized that I had made no discovery, since Julius Martin and myself had written the good stuff years ago and published it in THE PHOTO-MINIATURE No. 66, from which the editor of this "Condensed Course" had taken his chapter—without acknowledgment. Further reading showed that the book was largely made up on this plan of lifting "the good stuff" wherever found, a method which, given a discriminating and widely-read editor, certainly makes for a good book. This much being said, let me add that

the work under notice is a very practical and altogether desirable handbook to the photographic part of motion picture work. The information given is apparently gathered from actual experience and covers the field of motion picture operating, giving practical methods and formulas in every section. The many illustrations scattered through the volume supply interesting details of the mechanism and operation of the equipment used in prominent motion picture studios and laboratories.

PHOTO-ENGRAVING PRIMER. By Stephen H. Horgan. 81 pages. Cloth \$1.50. Boston: American Photographic Publishing Co.

There has long been a need for a "first book" or primer giving a brief but adequate account of the line and half-tone engraving processes by which almost all the illustrations used in newspapers, magazines, and books are made. This need is now provided for by the book here noticed. Few men are better equipped for the writing of such a first book than Stephen H. Horgan, whose practical knowledge and experience of these reproduction methods date back to their first introduction in America, and who is widely known by his "Half-tone and Photo-mechanical Processes" (now out of print), "About Photo-Engraving" and the "Process Engraving Department" in *The Inland Printer*.

The book gives clear and concise instructions for the making of line and half-tone engravings, with all the necessary formulas and lists of apparatus required for the successful working of the processes. A glossary of the terms and shop phrases used by photo-engravers, a wealth of useful hints on practice and a full index add to the practical value of the Primer, which will be welcomed by apprentices in photo-engraving, illustrators, editors, students and teachers in technical and industrial schools, and all who seek a practical knowledge of these commonly used reproduction methods. Foremen in photo-engraving establishments will find the book extremely useful as a desk book for reference in shop practice. I commend it as the best book of its kind and one that will not easily be improved upon.

THE PHOTOGRAPHIC RESEARCHES OF FERDINAND HURTER AND VERO C. DRIFFIELD: Being a Reprint of Their Published Papers, together with a History of Their Early Work and a Bibliography of Later Work on the Same Subject. Edited by W. B. Ferguson, K. C., Hon. F. R. P. S. Quarto, 374+xii pages; 100 illustrations; portraits; index. Buckram binding. Issued as a Memorial Volume by the Royal Photographic Society of Great Britain. American Agents: Tennant and Ward, New York. Price, \$9 postpaid.

The publication of this handsome volume is, as far as photographic literature is concerned, the event of the year. The interest and value of the book to the serious worker in photographic research is plainly indicated in the descriptive title, and a full list of its contents may be found in the advertising announcements of this issue, being too lengthy for inclusion here. Apart from the reprints of all the published papers of Hurter and Driffield, which have been inaccessible for years, there is included a complete reprint of THE PHOTO-MINIATURE No. 56 which was prepared by Mr. Vero C. Driffield as a summary of the research work in which he was associated with Dr. Hurter. The historical account of their work given by Mr. W. B. Ferguson, and the very full bibliography of later work in the same field, add considerably to the value of the book, which has a capital index.

PICTORIAL COMPOSITION IN PHOTOGRAPHY. By Arthur Hammond. 218 pages, with 49 illustrations by the author. Cloth, \$3.50. Boston: American Photographic Publishing Co.

This book differs (to the reader's advantage) from all other recent books on the same subject in that it deals the with pictorial composition from the viewpoint of photographer rather than from the painter's point of view; also in that it seems to be written from the author's personal experience and work, instead of rehashing a lot of miscellaneous material from what other men have said about the subject. There is, too, a conspicuous lack of the dogmatic teaching which has

made some recent works on pictorial photography wearisome to the average reader. Mr. Hammond does not pretend to lay down the law in precise terms, but wisely recognizes the fact that pictorial composition is largely a matter of feeling, and so suggests, with a demonstration of the working out of the idea here and there. It is a common sense book and should be very helpful to both professional and amateur photographers. The illustrations are, unfortunately, not attractive, and being poorly reproduced and badly printed, often fail to sustain the interest roused by the text. This apart, I cannot think of a more interesting or more useful book on the subject, and Mr. Hammond deserves much praise for his work.

THE FUNDAMENTALS OF PHOTOGRAPHY. By C. E. Kenneth Mees, D. Sc. 111 pages; illustrated; cloth-backed boards. \$1. Eastman Kodak Company.

Dr. Mees is one of the few men in photography today who has something to say and knows how to say it interestingly and with that brevity which is the sign manual of a complete understanding of the subject. In this slender volume of little more than a hundred pages, he gives us the most interesting, and therefore the most profitable, elementary account of the theoretical foundations of photography within my knowledge. Light and Vision, Lenses, the Light-Sensitive Materials Used in Photography, Development, the Structure of the Photographic Image, The Reproduction of Light and Shade in Photography and other fundamentals are explained and discussed with great clearness and directness in simple language for readers without any specialized scientific training. The illustrations deserve special mention as giving the reader what is probably his first clear idea of many things heretofore passed over by writers on photography, e. g., the crystals of silver bromide before and after development, etc.

Perhaps the omission of any systematic treatment of the problem of exposure was an oversight in the make-up of the book, or it may be that the reader is supposed to gather the theory of this from the chapter on The

Light-Sensitive Materials Used in Photography, and the numerous references to the function of exposure throughout the text. Similarly, the omission of any mention of Daguerre and his process may, at first sight, surprise some readers, but is possibly explained by the view that the Daguerreotype process lies out of the direct path leading from the discovery of the darkening of silver salts by exposure to light to the negative and positive processes of today. Be this as it may, the book is one which everyone interested in photography should possess and read—as often as is necessary.

A BOOK OF R. L. S. Words, Travels, Friends and Commentators. By George E. Brown. 298 pages, with 8 illustrations. 1919. New York City: Charles Scribner's Sons.

"There linger on the lips of men a few names that bring to us, as it were, a breeze blowing off the shores of youth. Most of those who have borne them were taken from the world before early promise could be fulfilled, and so they rank in our regard by virtue of their possibilities alone. Stevenson is among the fewer still who bear the award both of promise and achievement, and is happier yet in this; besides admiration and hope, he has raised within the hearts of his readers a personal feeling towards himself which is nothing less deep than love."

With these words Graham Balfour ends his "Life of Robert Louis Stevenson," and in the joyous affection of which he speaks we have the spirit of this "Book of R. L. S.," in which Mr. Brown sets out before us a rich store of curious and interesting information concerning Stevenson, his personality, works, travels, friends and commentators. It is a volume which will delight the hearts of all lovers of "R. L. S.," and will undoubtedly take its place alongside Sir Sidney Colvin's "Letters" and Prideaux's "Bibliography" as an indispensable item on every Stevensonian's bookshelf.

The chief aim of the book, as Mr. Brown tells us, is "to provide a commentary on his works as far as possible from Stevenson's own standpoint, by showing the

circumstances in which they were written, their history in *his* hands, and *his* judgments of them." The italics are mine; they indicate the special value of the volume in so far as it reveals the master's work as he himself saw it. Particularly interesting are the many references to the members of Stevenson's family and his friends, scattered throughout the book. Among these I find no mention of Virgil Williams and his wife, warm friends of Stevenson during the loneliest and most unhappy days of his life, when he returned to San Francisco from Monterey (1879-80) and fell into sickness and discouragement. Virgil Williams was a painter of no mean repute, a man of unusual culture and refinement, with a personality wholly charming. If I remember aright, he was actively associated with the California Camera Club of that period, and his "art talks" to the Club were published in "Wilson's Photographic Magazine" during the late eighties. In memory of their friendship Stevenson dedicated "The Silverado Squatters" to Mr. and Mrs. Williams.

The places visited by Stevenson in his wide wanderings—Davos Platz, the Riviera, Bournemouth, Paris and Barbizon, Sarañac, Monterey, San Francisco, the South Seas, Samoa and, last of all, Vailima, where he died, are all touched with memories, and the book gives many facts of bibliographical interest not readily accessible in any other single volume. A word of gratitude is due the author for the common-sense arrangement of the contents of the book in alphabetical order and for the excellent index.





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